

THE IRON AGE

FEB 16 1918.

New York, February 14, 1918

The Sixth Year of Progress

DURIRON

1918

ACID
ALKALI
RUST

PROOF

TRADE
MARK

DURIRON

1917

ACID
RUST

TRADE
MARK

DURIRON

1916

ACID
ALKALI
RUST

PROOF

TRADE
MARK

1915

DURIRON

ACID
ALKALI
RUST

PROOF

TRADE
MARK

1914

DURIRON

ACID
ALKALI
RUST

PROOF

TRADE
MARK

1913

DURIRON

ACID
ALKALI
RUST

PROOF

TRADE
MARK

1912

Duriron Castings Company, Dayton Ohio

New York Office: 90 West Street

Chicago: Otis Building

J. H. Bridge 97-180

TABLE OF CONTENTS - - - 457

Buyers' Index Section.....359
Wanted Section.....337

Contract Work Section.....346
Help and Situations Wanted.....341
Business Opportunities.....339

ADVERTISING INDEX - - - 376

Clearing House Section.....292
Professional Notices.....345

NATION WIDE STEEL-SERVICE

CHICAGO NEW YORK ST. LOUIS DETROIT



CHICAGO PLANT

IRON AND STEEL
REQUIREMENTS
FROM FOUR LARGE
STEEL-SERVICE PLANTS

JOSEPH T. RYERSON & SON
IRON STEEL MACHINERY

THE IRON AGE

New York, February 14, 1918

ESTABLISHED 1855

VOL. 101: No. 7

Advanced Ideas in Gray-Iron Foundry

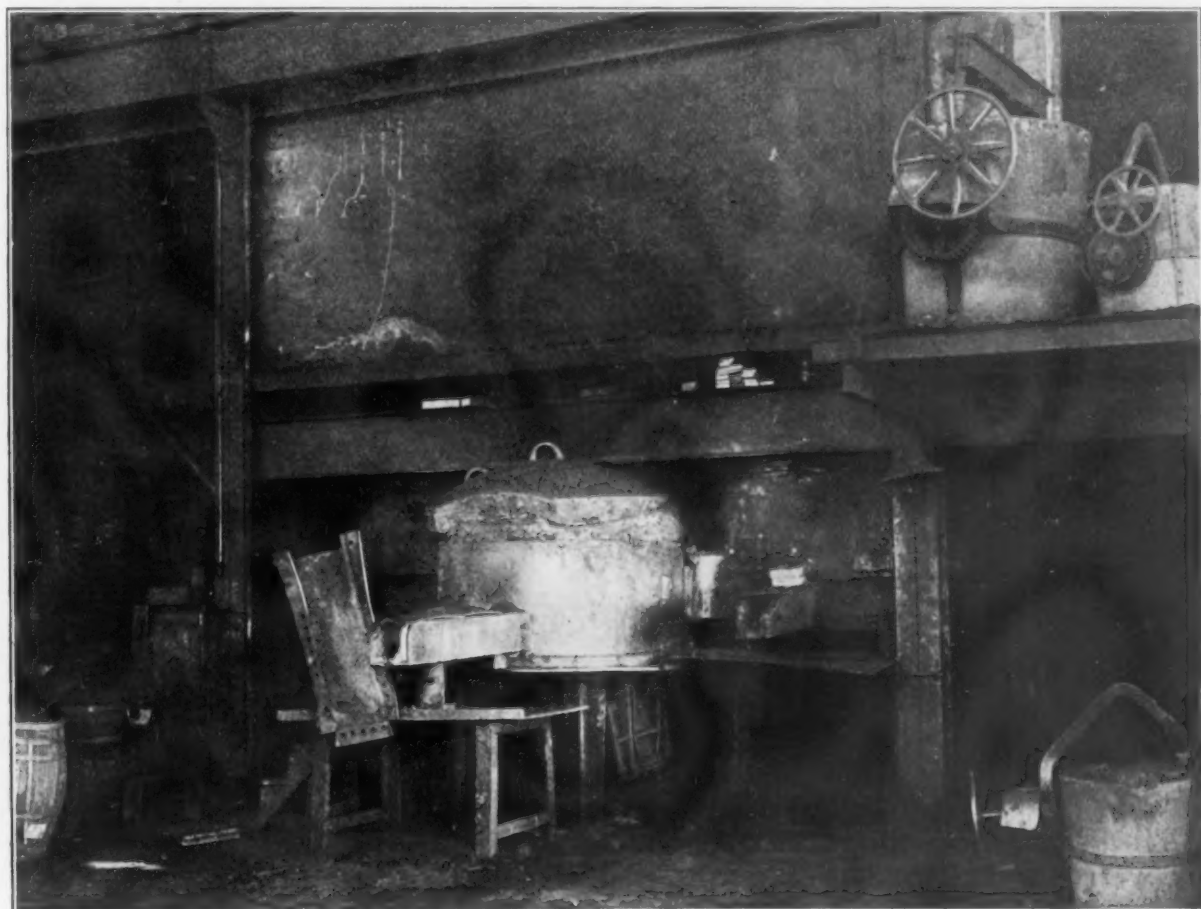
Two Cupolas Deliver Their Product to a Forehearth from Which Both Iron and Slag Are Taken—Thought for Employees

BY CHARLES LUNDBERG

THE James A. Brady Foundry Co., 4500 South Western Avenue, Chicago, has in full and smooth operation its new foundry containing nearly 100,000 sq. ft. of floor space, chiefly devoted as a general work or jobbing plant to the production of gray-iron castings. The plant is thoroughly modern, of handsome design structurally and in every sense a daylight shop. In its construction many features were combined, making not only for expediency in production, but for the health and well-being of the employees. Doing all he can for his people is something very much in the mind of the company's president, G. S. Burtis, not altogether because of altruistic motives, as he admits, but be-

cause he expects that his methods will result in making his men stick, as well as do better work. He wants every man employed to think of the foundry as his own.

The buildings of the new foundry are in the form of a U, two wings, each 90 x 250 ft., extending from the main building, which is 140 x 300 ft. and which contains the main molding room and a bay, the latter being devoted to bench molding. One wing is entirely used for the cleaning of castings and shipping, and the other to core making, machine and pattern shops and pattern storage. The roofs are of mill construction, and the side walls of sash and brick, with very little of the latter. The main



Forehearth Connected With Two Cupolas from Which Iron Flows Continuously After Melting Begins. The forehearth is lined with firebrick, and its bottom made up between heats similar to the cupola bottom. The cast-iron cover, also lined with firebrick, is removed each day. When placed in position it is lowered by crane on a roll of clay, so sealing top and bottom. The bell hanging from the bracket is rung when the blast goes on, and the shelf above provides a place for ladles not in use.



Cars at Left Enter Cleaning and Shipping Building. It will be noted that the roof of the main molding building slopes to the center from either side

building is 45 ft. from floor to roof, the latter being so constructed that it slopes to the center from both sides. On the perpendicular sides of the angles so formed are windows for light and ventilation. The design affords smoke and gases a wide sweep on their way to the outer air, the space being but little constricted as the windows are approached. The windows swing on perpendicular pivots, this arrangement causing less dust and dirt to settle upon them with a consequent greater admission of light.

Three traveling cranes in the main molding room are each of 15 tons capacity, with a span of 62 ft. and a lift of 25 ft. They were made by the Bedford Foundry & Machine Co., Bedford, Ind. The bay has a monorail for hoists along the side where pouring is done.

The melting equipment consists of two cupolas, one 90 in. and one 72 in., outside diameter, located at the center of the main building, the charging floor overlooking the yard between the two wings. The charging floor and the necessary supporting structure is of concrete, this including the stairway to the floor. The flexibility of the cupolas is enhanced by the use of a forehearth, a receptacle of 5 tons capacity, into which metal from both cupolas flows simultaneously. After the charge begins to melt, there is a continuous flow of metal into the forehearth, which serves at once as a mixer and a reservoir, assuring a more homogeneous mixture of iron from the two cupolas.

Among the advantages asserted for the arrangement is that the charge has a cleaner drop; and,

it being unnecessary to hold a heat, pending pouring, there is less danger of the charge bridging over. Likelihood of the iron flowing into the tuyeres is obviated, and a hot metal is procured, the crucible zone being shallow. The forehearth is tapped in the ordinary manner. All slag is taken from the back of the forehearth, which has a heavy removable cast-iron cover. Before use, the forehearth is heated with a wood fire, first being daubed so far as has been made necessary by the action of the previous heat. The smaller cupola may be tapped direct, if desired, and the larger one may be tapped separately by permitting its iron to run through the forehearth. Analysis is made of each heat. The cupolas, the combined capacity of which is 150 tons a day, are of Newton design, made by the Northern Engineering Works, Detroit.

In the floor of the molding room where large work is done is a reinforced concrete pit, 18 x 40 ft. and 7½ ft. in depth. Considerable space is devoted to the core department because of the manufacture of the company's specialty, the Brady ash conveyer, an application of the vacuum principle for removing ashes from steam boilers, which requires a pipe of great hardness. These are cast from a mixture called Brady metal. A stock of machine-made small cores of varying sizes is stored in racks. Over the core room and pattern storage is a 10-ton crane which has a span of 45 ft.

The cleaning and shipping room, on one side of which is a railroad spur, is served by a Northern 15-ton crane having a span of 90 ft. Air is used for cleaning and chipping. Unusually effective use is made of large tumbling barrels, one of which is 6 ft. inside diameter and 8 ft. long, and is used to clean wheels 54 in. in diameter, weighing 1785 lb. each.

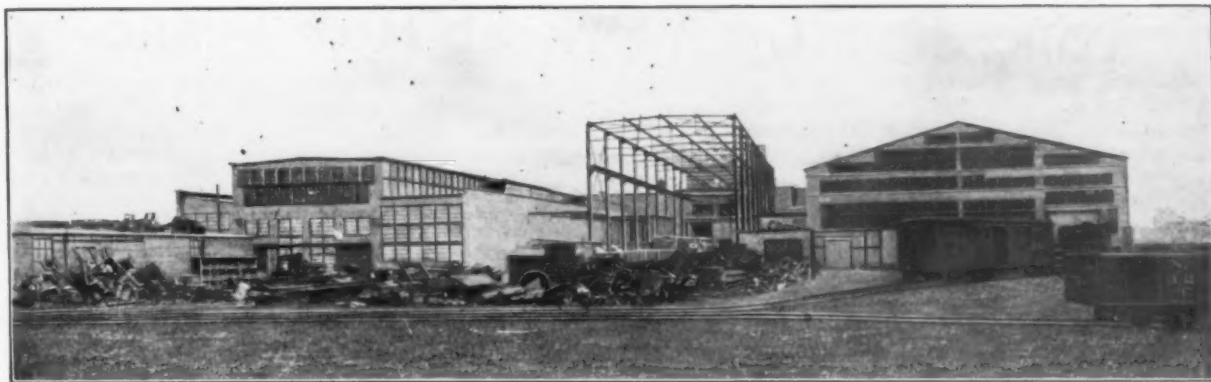
The material yard extending back from the charging platform has a covered runway supporting a 15-ton Northern crane with a span of 45 ft., which is equipped with a magnet for lifting pig iron and scrap from railroad cars or piles and placing it on the platform.

INTEREST IN MEN EXTENDS TO HOMES

The company employs a registered nurse, who not only looks after dressing cases, should there be any, as well as the general welfare of the employees around the plant, but she follows the example set by systems in vogue in larger institutions and devotes a part of her time to visiting the homes of the workmen, especially the homes of those whose actions or appearance suggests they are not living properly. At the home she helps by advice and suggestion. In a few instances she was not alto-



The Faith Reposed in the Motor Truck Is Exemplified by This Photograph, Which Shows a Truck Starting Out, Despite the Deep Snow, to Deliver Half the Top of a Sulphuric Saturator Used in a Chemical Plant. The piece weighs nearly six tons. Incidentally, the snowfall in Chicago in January totaled 40.9 in.



Rear of the James A. Brady Foundry Co.'s New Plant on Western Avenue, Chicago, Showing Crane Runway in Center. Also to be noted is the large number of windows

gether welcome at first, but when it became understood that the visitor was a nurse and that her mission was one of helpfulness, the attitude changed, and the wives of the men are now glad to have her call. These visits constitute a means by which knowledge of which men are worth while can be ascertained. If a man is away from his work she ascertains the reason. A report on each visit goes to the executive offices of the company, where such action is taken as may be deemed advisable. When men are employed the nurse makes medical observations and obtains the family history of the applicant.

Each Thursday the company has a meeting of its foremen for the discussion of shop problems and means of betterment. One noon hour a week it is endeavored to have a speaker from outside give the men a short informative talk on subjects of timely interest, those of recent date having been on Liberty Bonds and other subjects calculated to help the Government. A point recognized with regard to the speakers is that it does not do for them to talk over the heads of the men; in other words, they must express themselves in language the men understand, and win approval by using homely terms. The plant has an emergency room for first-aid treatment, locker rooms and shower baths. Coffee is served to the employees in pails supplied by the company at a cost of 3c. a pint. This, of course, is at the noon hour, and serving, as it does, to keep some of the men from nearby corners where liquor is sold, it is regarded, small as it is, as a proposition that pays well.

Negro labor is favorably regarded by the management; it being found, however, that negroes usually need training, and that, in doing this, it is well to imbue them with a sense of the importance of the work they are doing. The resultant vanity goes a long way in making them more useful.

Mr. Burtis entered the employ of the James A. Brady Foundry Co. fourteen years ago as a shipping clerk. He previously taught Latin and mathematics in a school at Leadville, Col., and subsequently, for a short time, worked as a switchman on the Denver & Rio Grande Railroad. It has been said of him that his early lack of knowledge of foundry procedure, especially of the ancient prejudices against various methods and materials that so often were found in a foundry, was largely responsible for the growth of his company. In other words, not knowing foundry fetichism, he did not fear it, but aggressively went ahead to find the best available methods suitable for his business. He was one of the first foundrymen to use by-product coke, and when he assumed control he speedily caused use to be made of a large jolt-ram molding machine that had been neglected. Many more molding machines

have followed the jolt-ram machine, electric riddles screen the sand, stock cores are made by machine and every part of the plant is accessible to crane service. The three overhead traveling cranes in the main molding room obviate waiting.

What is related here is not intended as a eulogy of Mr. Burtis, but as an exemplification of the fact that a man with an open mind, susceptible to suggestion and new methods, may sometimes make a business grow, despite a lack of long training in minor details, if he studies his problems intelligently and to a great extent disregards moss-grown precepts such as those to which the older school of foundrymen were particularly inclined to cling.

The James A. Brady Foundry Co. was established in 1900 as a jobbing foundry. It has occupied two locations in Chicago prior to the one where it is now situated. G. S. Burtis, president, is assisted by I. E. Burtis, secretary of the company. The telephone operator is an employee who lost his eyesight several years ago in an accident which occurred in the foundry and who was given a life-job at good pay. He handles the switchboard most efficiently.

The collapse of short thin tubes has been investigated by Prof. A. P. Carman, department of physics, University of Illinois, and a bulletin, No. 99, has been issued on the subject by the Engineering Experiment Station of the University of Illinois, Urbana, Ill. The object was to obtain an equation by which the pressure required to collapse the tube can be calculated from the dimensions of the tube and the elastic properties of the material. Seamless brass, aluminum, glass and rubber tubes were used in the tests.



First-aid Room in the Plant of the James A. Brady Foundry Co., Chicago. Such well-equipped rooms of the kind are not usually found in jobbing foundries. The nurse shown in the picture also makes it her business to know something of the home life of the employees.

Speeding Up Work at Hog Island

Extravagance to Be Curtailed at Shipbuilding Plant and Other Conditions Improved
—Admiral Bowles Will Direct the Work

WASHINGTON, Feb. 12.—Vigorous measures have been taken by the United States Shipping Board to bring about a speedy reformation of conditions at the Hog Island shipyard of the American International Corporation. Extravagance is to be curtailed on every hand, engineering methods are to be revised, labor is to be speeded up and every possible device employed in the hope of recouping a part of the big 100 per cent deficit which now threatens the Government.

Rear Admiral Bowles, who is in direct charge of all the shipyards of the country receiving Government aid, will at once move his offices to Philadelphia and devote himself almost exclusively to straightening out the affairs of the Hog Island yard. A naval constructor of long experience and for several years president of the Fore River Shipbuilding Co., Admiral Bowles is fully equipped for this important task and it is believed that, if his time had not been necessarily divided among so many projects but could have been devoted entirely to the fabricated shipyards, the present unfortunate situation at Hog Island would not have developed. Admiral Bowles will take with him a staff of experts who will not only provide the necessary inspection for the Hog Island yard but will also install immediately a cost-accounting system that will prevent a recurrence of anything like the amazing conditions developed by General Manager Piez's report in which he lists items of cost exceeding from 100 to 574 per cent the original estimates, not to mention nearly a million dollars expended for necessary items of which the engineers had taken no account.

Two Important Tasks

Admiral Bowles and his staff will concentrate themselves upon two tasks; first, to expedite the completion of such parts of the Hog Island yard as will permit the speedy construction of a part of the ships contracted for, and second, to cut expenses to the quick. The original layout of the yard contemplated 50 shipways and the engineering plan involved the contemporaneous building of all these ways and the auxiliary shops and other facilities. The Shipping Board has approved Mr. Piez's recommendation that work on 18 of these shipways be temporarily abandoned and the remaining 32 will be pushed as rapidly as possible. All other units, including power, machine shop facilities, etc., will be treated in the same manner and to all intents and purposes the yard will be reduced a little more than one-third in the hope of gaining proportionately in early production of ships. According to the plan heretofore followed, few, if any, ships have been completed during the current calendar year. By devoting all facilities and the greatest possible energy to the work, it is hoped that within the next six or eight months actual deliveries of a few ships can be made and that thereafter the rate of delivery will steadily increase until the projected maximum of three ships a week is reached.

Closer Supervision

It is understood here that the American International Corporation has promptly agreed that the Shipping Board shall exercise a closer degree of supervision of expenditures at the Hog Island yard and will cooperate in the effort to bring down costs. There is little hope that the yard can be completed for anything like the original estimate of \$21,000,000, but Admiral Bowles believes that with rigid economy and a much more rigorous policy with respect to the supervision of labor, the total cost of the yard will not reach the figure predicted by Mr. Piez, which was approximately \$45,000,000. In view of the fact that weather condi-

tions during the coming months are almost certain to be more favorable than they have been since the yard was started, it is hoped that the excess of cost over estimate may be kept down to 60 per cent.

The labor problem at the Hog Island yard is to be handled in vigorous fashion. There is to be no more indiscriminate hiring of men not immediately needed and it is believed that the labor turnover which, according to Mr. Piez, has at times approximated 100 per cent, can be very materially reduced. The labor bureau of the yard is to be reorganized and the qualifications of every man are to be carefully looked into before he is hired. The report made to the Shipping Board by Mr. Felton, an engineer attached to the War Department, that only five out of every 100 men about the yard have actually been employed has resulted in orders under which there will be a greater measure of supervision than heretofore. Foremen will be assigned to smaller working gangs and the entire working force will be carefully combed over in search of expert mechanics with sufficient personality to make good foremen and superintendents.

Speeding Up Delivery

It is hoped that by the time the 32 shipyards at Hog Island are completed the labor at the yard will be so organized that it will be possible to put on three shifts at the actual work of shipbuilding. It is intended to run all shops and auxiliaries on the same basis, if necessary to keep up with the shipbuilders, and plans have already been outlined for speeding up the delivery of material and especially for hastening the work at the fabricating shops where plates and shapes are cut and fitted for assembling at the yards. The steel producers, though badly hampered by weather conditions, fuel shortage, and congested transportation, have the matter of supplying material for the fabricated ships well in hand and no serious delays on this account are expected. The accurate standardizing of this material has proven an immense advantage not only in getting it out but in moving it, as all parts are interchangeable. Care has also been used in routing this work so that the parts first needed would first be delivered. This precaution has also obviated the necessity for storing material in quantity, and adherence to this plan is counted upon to effect a substantial saving in the cost of assembling the ships.

Mr. Baldwin's Statement

The Shipping Board is in receipt of a statement prepared by George J. Baldwin, vice-president of the American International Corporation, delivered by him before the Philadelphia Chamber of Commerce on Feb. 7, reviewing the work accomplished at the Hog Island yard and describing some of the difficulties encountered which have contributed to the greatly increased cost of the work as reported by Mr. Piez. Mr. Baldwin also makes public for the first time some interesting details of the contracts for the construction of the yard and for the building of the 120 ships ordered by the Emergency Fleet Corporation.

"It is impossible," says Mr. Baldwin in this statement, "for the public mind as yet to grasp the size of the task confronting the Emergency Fleet Corporation, or the vast readjustments of national industries and the many changes of occupation which have been forced upon millions of our people by the war. We are passing through a period of both reasonable and unreasoning criticism of almost all of our great lines of war effort. The Shipping Board is criticised for not having produced more ships; the railroads are denounced for not transporting our freight more ef-

ficiently; our great corporations are held up to scorn as profiteers; many of the departments of Government are under fire charged with inefficiency and inadequate preparation. Our own corporation is thought by some to be extravagant in its shipbuilding methods and producing ships too slowly. A wave of hysteria seems to be temporarily clouding the calmer judgment of ordinary times, but all of these things are temporary and will pass away as the country steadies itself in a definite and effective concentration upon the work before it."

Great Demands of Plant

The Hog Island yard, Mr. Baldwin says, contains 900 acres and will have 50 shipways in five groups of 10 each, and a fitting-out basin containing seven piers, each 1000 ft. long with a capacity of four ships per pier. The classification, storage, holding yards, and distribution tracks for material entering into the construction of the 120 ships will require 75 miles of standard gage railroad track. The covered buildings, such as plate and angle shops, blacksmith shops, machine shops, and so forth, with office buildings, mess halls, fire stations, police headquarters, living quarters, will include more than 25 acres under roof; 75,000,000 ft. of lumber will be used, about half a million tons of steel, and nearly 30,000 men will be required as a maximum, a larger force than has ever been organized for shipbuilding in any previous year.

Mr. Baldwin contends that but for unforeseen circumstances there would have been no important increase in the cost of the Hog Island yard over the original estimates. "It is impossible," he says, "to estimate the cost of such a proposition conducted under its many inherent difficulties, but we believe that the original estimate submitted last June of approximately \$20,000,000 for the yard, which was concurred in by the best judgment of the officers of the Emergency Fleet Corporation and the engineers of the American International Shipbuilding Corporation, would have been sufficient if the work could have been commenced at that time. Difficulties in transportation and labor which could not be foreseen and the all-important fact that postponement in starting the work made it necessary to perform the heavy part of it during most severe winter weather will very materially increase the cost of the work."

Estimated Costs

"The total estimated cost of the first 50 7,500-ton boats at \$1,100,000 each is \$55,000,000. The fee for constructing each boat is \$55,000 with certain penalties which may reduce it to \$41,000, one-half payable when each boat is one-half completed, and the remainder when it is accepted by the Government. The second lot of 70 8,000-ton boats, at an estimated cost of \$1,650,000 each, totals \$115,500,000. The fee per boat is \$82,500, perhaps reduced by penalties to \$65,000. The aggregate estimate for the boats and yard is \$200,500,000, in addition to a probable expenditure for necessary housing for laborers of perhaps \$10,000,000 or \$12,000,000.

"We have estimated that we can deliver 25 of these boats in 13½ months from Sept. 13, 1917; 25 more in 15 months; another 25 in 18½ months; a fourth 25 in 20 months, and the last 20 in 22 months from this contract date, which will require an average delivery of one ship every two days during the eight and a half months specified."

Value of On-Time Deliveries

Mr. Baldwin presented some interesting figures showing from a financial standpoint the value of on-time deliveries of the vessels to be built at Hog Island. The total tonnage so far ordered is 935,000 deadweight tons, capable when constructed of earning at rates fixed and approved by the Shipping Board Chartering Committee for steamers of 6000 tons or greater deadweight capacity, approximately \$10 per month per ton, or \$307,186 per day or \$9,215,593 per month. These figures emphasize the importance of saving time as a commercial proposition, but of course

the value of early completion for the purpose of winning the war is beyond computation. The extent to which the ships to be built at Hog Island have been planned as a standardized manufacturing proposition is emphasized by Mr. Baldwin, who declares that it marks a new era in shipbuilding. "The fabricated idea," he says, "simply means that you have a 'manufactured' ship instead of a 'made-to-order' ship, just as we have 'manufactured' automobiles instead of 'made-to-order' ones."

Non-Essentials Suppressed

"All non-essentials have been suppressed. Curvature of plates, especially those requiring multiple bending, were as far as possible eliminated. Ordinarily structural steel beams were submitted for special ship shapes. No camber of the decks, but flat like those of a battleship; no shear, but a straight deck line from bow to stern, perpendicular sides, and a flat bottom, a strictly rectangular midships section only curving on the bilges; a design of boat carefully combining the best ship and bridge builders' practice with that of our most efficient manufacturers. Maximum cargo space, was adjusted to maximum safety, utilizing a multiplicity of bulkheads, which have saved more than one torpedoed oil tanker from going to the bottom. This designing has been so accurately and carefully done that the model tested in the Government testing tank shows a speed as great and requires as little power as the average vessel turned out in our best shipyard practice.

"If fabricated shipbuilding is a success, and there is no reason to suppose that it will not be, the methods of building cargo ships may be revolutionized and Philadelphia become the shipbuilding center of the world."

In conclusion, Mr. Baldwin says that if a steady flow of material to the yard can be assured and if the full program of 50 ways after the completion of the 32 on which work is being hastened is adhered to, it is not unreasonable to expect the ships to be delivered in accordance with the original program. Notwithstanding the increase in expenses and despite the delay caused by circumstances beyond control he is confident that the increased final cost of the 120 ships "will not exceed 10 per cent of their total cost, even charging the entire cost of the yard solely to these vessels."

A Combination Swivel and Chain Repair Link

The Cleveland Galvanizing Works Co., East Cooper Avenue and Pennsylvania Railroad, Cleveland, has brought out a substitute for the ordinary repair link and swivel used with chains. The new device combines the two in one and among the advantages claimed for it are strength, simplicity and the freedom of motion which is said to be equal to that of a high-grade ball bearing. The link has but three parts, two half links and a simple connecting section. In use the two half links are slipped through the ends of the portions of the chains which it is desired to join after which the connecting member is slipped over the ends of these links. In making the connection a hammer, a pair of pliers or a vise is all that is claimed to be required. The link is furnished in three sizes for use with different weights of chain and in addition can be supplied for joining, welded, weldless or flat link chains.

What is claimed to be a satisfactory substitute for platinum for use in the electrical industry is set forth in a patent (U. S. 1,248,621, Dec. 4, 1917) granted to Hugh S. Cooper, Cleveland, and assigned to the Electric Metals Products Co. of that city. It is an alloy of gold, silver and osmium having a high melting point and great hardness. It is also stated to possess ductile and malleable properties and an electrical conductivity similar to platinum.

The Duriron Castings Co., Dayton, Ohio, announces the removal of its Chicago office to the Harris Trust Building, to continue in charge of George A. Cocup.

RAILROAD TRACK DEFECTS

Reduced Ballast and Rail Design to Mitigate Alternate Stresses

HOLDING that the transitory depression of standard railroad track as a train passes over it sets up in the rails excessive repeated alternate stresses which, augmented by torsional moments, lead to fractures such as occurred on the Galveston, Harrisburg & San Antonio Railroad near Iser, Tex., Jan. 31, 1916, an investigation of which was made by the Interstate Commerce Commission as described in *THE IRON AGE*, June 7, 1917, G. H. Barbour, assistant chief mechanical engineer, Carnegie Steel Co., Pittsburgh, in a paper presented before the American Association for the Advancement of Science at its annual convention in Pittsburgh, Dec. 28, discussed what he deems fundamental defects in track construction. A review of his paper follows:

Standard steamroad track comprises a well-drained subgrade of compressible soil on which is spread and compacted a cushion of broken-stone ballast from 15 to 24 in. in depth. On this are strung at intervals of about 22 in., 7 by 9 in. by 8½ ft. wooden crossties for supporting the rails. Track is anything but restful under the hurtling mass and projectile impulse of fast-flying equipment. The rails undulate and wave, the crossties rise and fall and the whole track depresses under the wheel contacts of the train.

While the cushioning action of these undulations is necessary, excessive deflections are perilous. The extreme fibers of the rails are bound to experience the stresses induced by such curves and so it is advisable to reduce the depth of the ballast and to increase the bearing area of the crossties, since from 75 to 80 per cent of the subsidence occurs in the ballast and the remainder in the subgrade.

Danger is involved in increasing the height of the rail to obtain the requisite girder strength now that 85 to 100-lb. rails are found to be inadequate; for the stresses in the extreme fibers increase with their distance from the center of gravity of the rail section. An unappreciated feature of track is the sufficiency and frequency of the rail's lateral fastenings. Turned-out rails and spikes forced back into the wood are of common occurrence and reveal the magnitude and intensity of the lateral forces. Double fastenings could be provided for each crosstie were broader ones adopted.

Wheel Spans and Loadings

The rail is commonly considered a girder spanning from crosstie to crosstie, but it has been demonstrated that the span from wheel to wheel governs the maximum vertical bending moment. Maximum combined stresses are experienced at a wheel contact when it occurs half way between a pair of crossties, for in that position the lateral forces produce the greatest horizontal bending moment. The head of the rail is in compression at the wheel contacts and in tension between them and its base vice versa; hence continually repeated reversals of stress and alternate vertical deflections result.

Independent of magnitude and spacing is the importance of so loading the locomotive wheels that heavy loads do not have wide spacing. An ideal loading would have the forward truck wheel the lightest with a gradual increase to the middle driver and a gradual decrease to the trailer which should not have over two-thirds the static load of the main driver. A great many locomotives produce greater stresses under the trailer than anywhere else, to which its position approximately under the center of gravity of the combined engine and tender and its wider spacing are contributory.

Defects of Rails and Their Amelioration

The joint is the great defect in rails, due to 14 in. more or less of the rail end being held so rigidly in the viselike grip of the splice bars that it cannot deflect freely. For this condition there is no cure, though it can be ameliorated by diminishing the depth of the

transitory depression of the roadbed as the train passes over it and by the use of a splice bar in contact with the rails only at its ends and center. Other defects, even in such heavy installations as the 130-lb. Pennsylvania Railroad and the 136-lb. Lehigh Valley rails, are lack of lateral strength, insufficient width of head and low center of gravity. In rail design the problem is not only to satisfy the vertical loads on the wheels plus their dynamic augments, together with the lateral forces resulting from the swaying, lashing and tangential impulses of the equipment; but also to compensate the accompanying torsional or polar moments. These are, first, the product of the lateral forces by the vertical distance from the top to the center of gravity of the rail and, second, the product of the load on the wheel by the horizontal distance from the rail's vertical axis to the center of the black streak or line of wheel contact which generally occurs on the outside of the railhead. At the same time the height of the rail should be maintained at the minimum to relieve the critical fibers of its head during the transitory depression, because the head is the point of peril on account of the peening punishment of the impinging wheels, the grinding action of their flanges and the friction of their brake-bound treads, cumulatively aggravated as the wheels become ragged and worn.

These considerations are best met by making the railhead broader to bring the black streak nearer its center, by raising the rail's center of gravity to reduce the torsional lever arm of the lateral forces as well as the distances from its center of gravity to the critical fibers of its head, by increasing the rail's lateral strength to resist the horizontal bending moment as well as to augment its polar or torsional section modulus; and withal, by striving for the lowest rail that will provide the necessary girder strength and satisfy the above conditions. With locomotive wheel loads as great as 35,000 lb. plus dynamic augments as high as 50 per cent contributing to the prevalence of transverse fissures, relief is to be found in distributing the weight of the equipment on more wheel contacts and in maintaining the treads of wheels in better condition.

The American Society of Civil Engineers and the American Railway Engineering Association are now engaged in exhaustive researches to determine the stresses in railroad track, through a joint committee under Prof. A. N. Talbot, University of Illinois. The railway interests have this matter at heart and are doing all they can considering their financial handicap. The weights on the wheels are known within reasonable limits, but dynamic augments are uncertain. George L. Fowler has made authoritative and exhaustive experiments on lateral forces. European practice cannot help us much; their toy vans and Lilliputian trains place them where we were a generation ago and our boys abroad are as likely to teach as to learn.

A Safe Factory and Workshop Step-Ladder

The Chesebro-Whitman Co., Inc., 1167 First Avenue, New York, has brought out a new design of portable step-ladder. The front member of the ladder extends about 2 ft. above the rear one and terminates in a round bar as a safety hold and to allow for working in cramped quarters. A pocket approximately 5 in. wide and 5 in. deep is located directly below the top bar for holding tools. The back is provided with rungs, which allow two men to use the ladder when necessary. A safety spreader is relied on to prevent accidental cutting or pinching of the hand when opening the ladder.

The Reynolds Electric Co., 422 South Talman Avenue, Chicago, has developed a type of automatic controller or rotary switch. Although designed primarily for operating a fire alarm siren the controller may be used for light and audible signals and similar services. The controller is started by pressing a pushbutton switch. This starts the driving motor, and the circuit is interrupted at the end of 2 min. by another switch on the controller, thus giving what is practically an automatic device.

Electric Drying Ovens in a Rod Mill

Three Units Have a Greater Capacity
Than Seven Gas-Fired Ovens and the
Life of the Drawing Dies Is Lengthened

A NEW use of electricity in industrial plants has been made by the National Screw & Tack Co., Cleveland, which recently substituted electrically heated ovens in its rod mill for gas-fired ones for drying the acid out of rods before drawing. Owing to the cutting off of the natural-gas supply to industrial consumers because of its scarcity, the company was compelled to provide some other method for heating its ovens. The electrically heated ovens, which have been in use several weeks, have given general satisfaction, and have been found to have a much greater capacity and various other advantages over the gas-fired ovens.

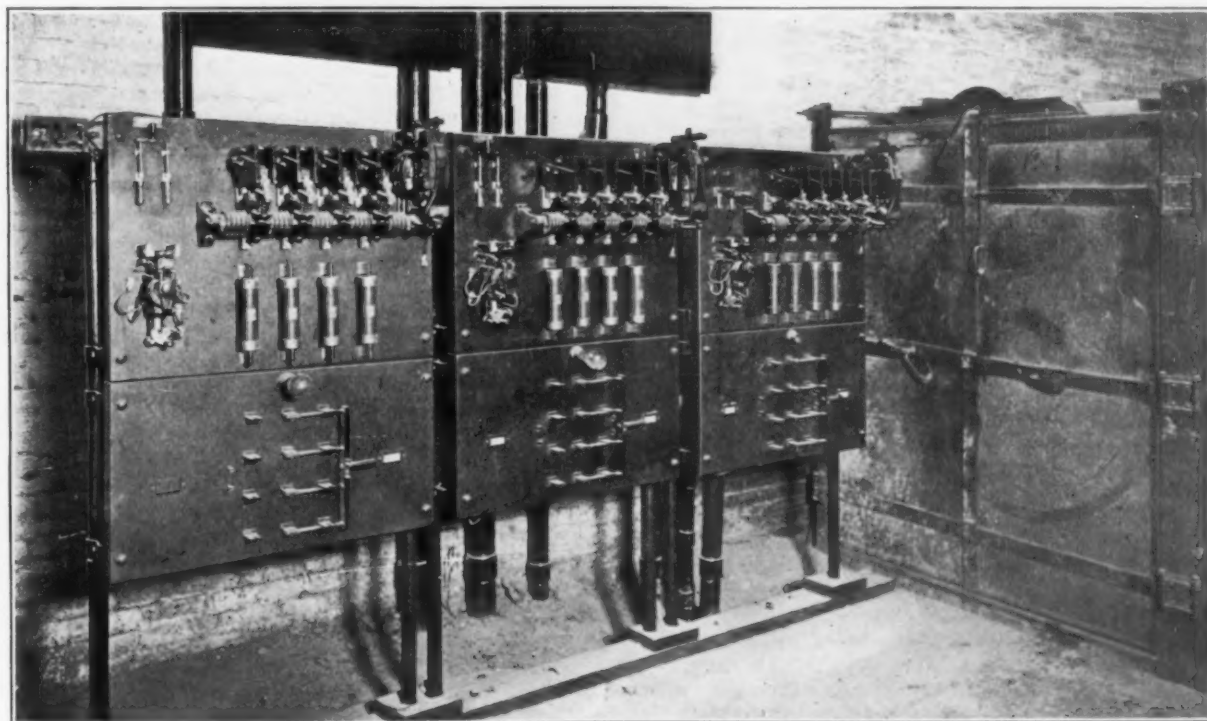
Formerly seven gas-fired units were required to do this work, which is now accomplished with three electric ovens. Of these only two are used at a time, one being kept in reserve. It took from $2\frac{1}{2}$ to $2\frac{3}{4}$ hr. to heat up the gas-fired ovens to a temperature of from 380 to 400 deg. Fahr., but with electric ovens the required temperature is obtained in 15 to 18 min. In practice the rods, usually in coils, are pickled and then given a coating of lime before drying. When gas-fired ovens were used the rods, after being pickled and coated with lime, became cold before the ovens were brought up to the required temperature in the morning. Now that the ovens are electrically heated they are ready for use as soon as the rods leave the tanks in which they are lime coated, and the coils go direct to the ovens at a temperature of 100 to 150 deg., at which they leave the tanks.

When gas was used it was necessary to keep the rods in the ovens from $1\frac{1}{4}$ to $1\frac{1}{2}$ hr., but with the electric ovens the rods are dried in from 10 to 20 min., the longer period being required for larger sizes. The comparatively long time required for

drying out the rods in the gas ovens is attributed to the moisture in the hot gases that pass over the coils, but which is not present in the dry radiant heat of the electric ovens. When gas was used from 16 to 18 tons of rods were dried in an oven in 12 to 13 hr. With the electric ovens 45 to 55 tons of rods are dried in one oven in a 10-hr. run, and an output of as high as 80 tons has been secured in that time.

Another advantage found in the use of electric ovens is that rods electrically dried can be handled better through the dies during the drawing operation, and the dies are found to last longer. This is due to the fact that a glazed coat is left on the rods when dried in a gas oven, and this coating scratched the rods and clogged the dies. When electrically dried this glazed coating does not appear. The cost of electricity for heating is greater than gas, but it is stated that the increased output makes the cost per ton less. The increase in tonnage is about 200 per cent, with an increase of only about 33 per cent in the cost of electricity for a given period.

The ovens are standard gas ovens of the Crawford type with chambers 21 ft. deep, 6 ft. high, and 5 ft. wide. Each oven is provided with 24 standard low-temperature japanning oven heaters with a capacity of $3\frac{1}{2}$ kw. each. Instead of placing the heaters along the sides of the oven as is customary in electric japanning ovens, the heaters are mounted in two rows in a pit under the rails that provide a runway for the buggies on which the coils are loaded for charging into the ovens. A wire screen extends from the rails to the sides to prevent coils from dropping into the pit and injuring the heaters should the coils fall from the trucks. With



Each of the Ovens, One of Which Is Shown at the Right, Has an Independent Control Panel Equipped with a Double-throw Switch, Contactor, Reversing Relay, Fuses and Indicating Lamp, the Meters Being Located in Cabinets Above the Panels

the substitution of electricity for gas the ovens will be covered on the sides and top with a silica brick, this installation being provided to reduce the heat losses. The usual charge is about 6 tons of coils loaded on three buggies. These are of steel weighing about 500 lb. each.

The current is two-phase, 60-cycle, with a voltage of 440 on the heaters and 110 on the control circuit. The energy required for each oven is 144 kw. The current consumption is 45 kw.-hr. for each charge of the oven.

Each oven is provided with a standard industrial heat control panel mounted on pipe supports. Connection to the panel is made through eight cables by a four-pole double-throw switch on the panel. The control panel also carries a four-pole contactor, reversing relay, fuses and indicating lamp. Automatic control of the temperature of each oven is obtained by a Tycos electric contact temperature control instrument, which is connected to the 110-volt control circuit. Although the range of the temperature is 20 deg., the stationary contacts to the instrument can be placed close enough together to keep the range of temperature between 10 deg. As a safety feature, the two oven doors at each end are provided with door switches. These are on the control circuit, and are located so that when either door is opened the current is shut off, making it impossible for the workmen to get a shock when entering the oven. The current is also automatically turned on when the door is closed, making it unnecessary for the attendant to go to the control panel to turn on the electricity. While the ovens are now used only for drying the rods, it is the intention to use them also for annealing, which will require a higher temperature and longer time.

The heating units, control panels and other electrical equipment except the temperature control instrument, were supplied by the General Electric Co., which will shortly make a similar installation at the Elyria, Ohio, plant of the Elyria Iron & Steel Co.

Book Review

Principles of Iron Founding. By Richard Moldenke: pages, 517, 6 x 9 in.; illustrations, 45. Published by the McGraw-Hill Book Co., Inc., New York. Price \$4. For sale by the Book Department of THE IRON AGE.

Dr. Moldenke's identification with the American foundry and its advance in the past 20 years makes him peculiarly the man of his time to "set in order" the principles of modern iron founding. At times it has seemed that of the making of many books dealing with the foundry there is no end, but nearly all of the previous works have followed the plan of describing foundry equipment and processes without going very deeply into underlying principles. Some of them again have covered only the particular part of the field in which the author's experience had been gained. Dr. Moldenke's connection with foundry operations at the beginning was with the metallurgical side, but since the early nineties, when he had to do with the production of malleable castings, his work has been constantly broadening, his activities as secretary of the American Foundrymen's Association for a dozen years or more and his special investigations of foundry processes and materials giving him an acquaintance with foundry practice in the United States that is probably duplicated in no other single experience.

The study of the metallurgy of cast iron and the resultant literature had long been coupled with a series of carbon diagrams which originated in Great Britain, and it was not so many years ago that the papers read in the various foundrymen's associations throughout the country were a monotonous reiteration of well-known facts concerning the influence of the various

metalloids on the properties of pig iron and the metal resulting from melting it in the cupola and pouring it into a sand mold. There was a sameness also in previous literature dealing with foundry equipment, particularly a sameness in the illustrations. In the present volume Dr. Moldenke treats comprehensively the principles underlying the approved foundry practice of to-day. In the first chapter the development of the foundry from early times to the present is rapidly sketched, and Chapter 2 deals with the industrial status of the foundry. Organization is the subject of Chapter 3, which is brief. The first three chapters seem scarcely germane to the main theme of the book, which is really modern foundry processes, materials and metallurgy.

Dr. Moldenke is particularly at home in the section dealing with cupola processes, as these have had the benefit of much of his research work of the past fifteen years. Following a chapter on the technology of combustion are two long chapters on melting processes. In these is the most valuable material of the book. There is a chapter also giving an outline of iron metallurgy, another dealing with iron making processes and one devoted to the properties of cast iron, this last embodying some interesting matter on analyses of special cast irons. The chapter on the classification of castings is more elaborate than anything that has appeared, due credit being given to the laborious investigation of this subject made by Dr. John Jermain Porter some years ago. Dr. Moldenke does not hesitate to take a stand on debatable questions in foundry metallurgy and reiterates with some elaboration his position as to the effects of oxygen in cast iron and the properties possessed by castings made from pig irons to which oxygen additions have been made. Time has brought no change in the author's attitude toward "semi-steel." The good results coming from additions of steel scrap in cupola mixtures are recognized, but it is insisted that the resultant castings are still simply cast iron and that no kinship with steel should be claimed even though there is the modifying prefix "semi." It is a question whether in the now well understood use of the term "semi-steel" there is either any such misrepresentation by the maker or misunderstanding by the buyer as the book would attach to the present-day commercial product carrying this name.

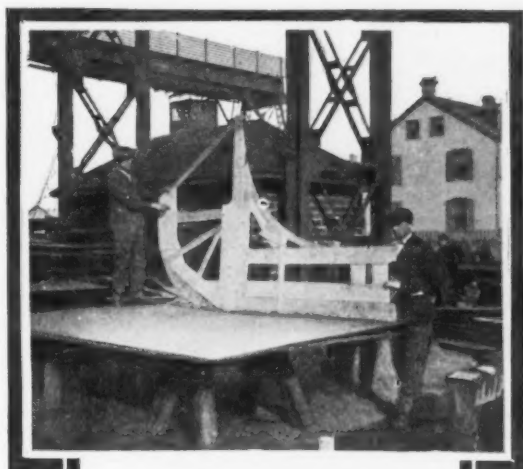
The chapter on Mixture-Making is the nearest approach made by the book to the long familiar studies of foundry associations and the early foundry experts into the effects on the casting of varying contents of silicon, sulphur, manganese, phosphorus and carbon in the mixture. Dr. Moldenke has had a vast amount of experience in the testing of cast iron, and one might have expected a longer chapter on that subject. The author's extended investigations of American molding sands made for the American Foundrymen's Association are summarized and considerable new material added. The whole discussion of foundry raw materials is practical and serviceable.

Later editions will no doubt eliminate the few minor oversights in editing and make more definite some of the statements on metallurgical points that are too condensed to satisfy every demand of accuracy, as, for example, "when the carbon percentage runs below 2.00 we have a steel; when above, a cast iron." No other work on foundry metallurgy, melting processes and materials has brought together so much new and valuable matter and in form so highly interesting and serviceable, and it is to be expected, therefore, that it will be widely circulated and read. E.

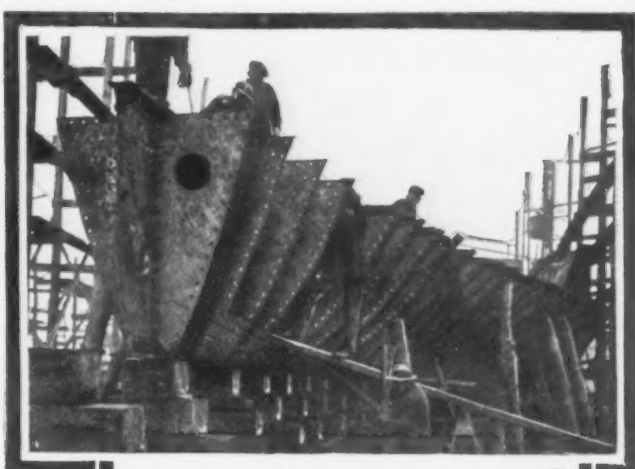
Graham furnace at Graham, Va., operated by the Pocahontas Pig Iron Corporation, is about to start up on ferromanganese, having operated on spiegeleisen for the past two months. The ferromanganese will be produced on a conversion contract.

The Beatty Machinery Mfg. Co., builder of punching and shearing machinery, is now located at 150th and Oak Streets, Hammond, Ind.

Work for Which 250,000 Mechanics Are Needed

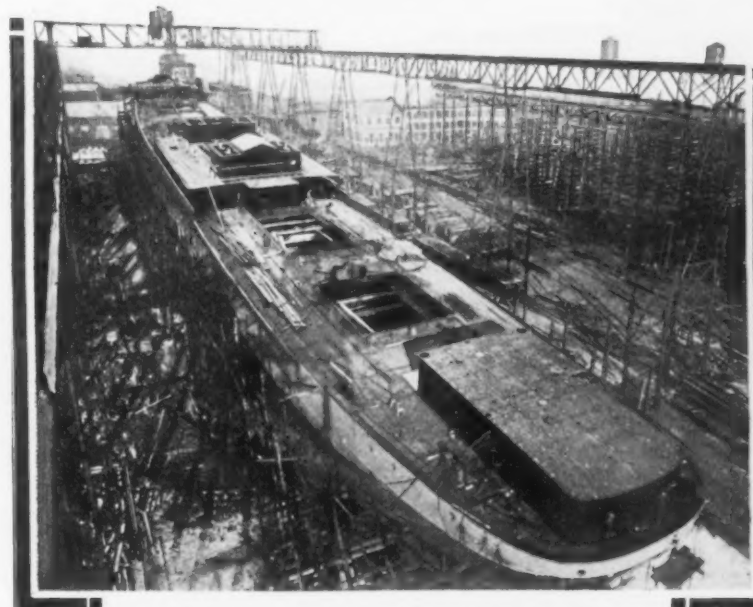


Template for marking rivet holes



Keel plates at the bow

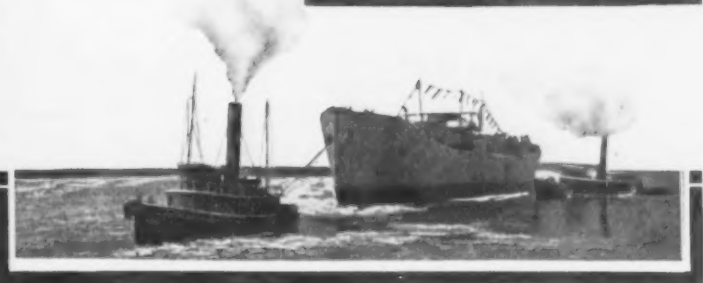
Fabricating a steel mast



TO help the Department of Labor mobilize the industrial army for shipbuilding, readers of THE IRON AGE are asked to encourage what employees they may release to enter this service.

The illustrations are from copyrighted photographs of the Committee on Public Information. An illustrated catalog giving a complete list of the titles of the 800 or more official war pictures has been issued. Any picture may be obtained for 10 cents each, for private collection purposes, by sending cash, check or money order to the Division of Pictures, Committee on Public Information, 10 Jackson Place, Washington, D. C. The catalog will be sent upon receipt of 5 cents.

Some idea of the size of a rudder



CORROSION OF IRON AND STEEL

Their Preservation in Reinforced Concrete— Inhibiting Effect of Alkalies

IN a paper on "Corrosion of Iron and Steel with Special Reference to Reinforced Concrete," recently read before the Concrete Institute (British) by Dr. J. Newton Friend, the author, after a historical survey of the subject of iron and its uses and the early records extant on the subject of corrosion, submitted the following facts bearing on the cause of rust formation:

Water, alone, is without appreciable action upon iron at ordinary temperatures. This he illustrated by tubes exhibited containing iron and air-free water, hermetically sealed 11½ years ago. Apart from the merest trace of tarnishing, which could only be detected under a powerful light, the metal appeared to have undergone no change whatever.

Water vapor is without visible action upon iron at ordinary temperatures. Iron might be heated for prolonged periods in steam up to about 300 deg. C. without undergoing any apparent change. At 350 deg. C. and somewhat above, ferrous oxide was produced, the surface of the metal being tarnished and gaseous hydrogen evolved. At still higher temperatures magnetic oxide of iron resulted and formed a skin on the surface of the metal, which tended to protect the underlayers from attack. This, however, was but rusting in the ordinary acceptation of the term. It was oxidation, and was the principle of the Barff process of protecting iron from corrosion.

From the foregoing it was clear that oxygen and liquid water were essential to corrosion.

After a few remarks upon the chemical nature of rust the author proceeded: At ordinary temperatures a very dilute solution of sodium carbonate is considerably more corrosive than tap water. But if the concentration be increased to 0.25 per cent and above, the metal is entirely protected from rusting. Similarly, a 3 per cent solution of common salt at about 10 deg. C. is much more corrosive than tap water at the same temperature, but as the temperature rises the relative corrosivity falls, so much so that at 21 deg. C. the solution is appreciably less corrosive than tap water. Since sea water contains some 3 per cent of sodium chloride it is of interest to note that at 18 deg. C. (64 deg. Fahr.) and above, all dilutions of sea water are less corrosive than tap water, while at lower temperatures they are more corrosive.

Effect of Alkalies

For many years it has been known that alkalies, if present in sufficient concentration, will completely inhibit corrosion. Should, however, large supplies of air gain access, carbonates are produced and these greatly accelerate corrosion unless the concentration of alkali is sufficiently great to yield 0.25 per cent solution of carbonate. Lime, of course, behaves similarly to caustic soda or potash. Hence, in attempting to protect iron permanently with free alkalies, such as lime, it is necessary to consider, not merely the protection afforded by fresh caustic lime, but that which will be afforded when the atmosphere has converted the lime into carbonate.

An interesting case arises when iron is immersed in alkaline solutions containing inorganic salts. For example, iron will remain bright in a 1 per cent solution of caustic potash for an indefinite time, but upon addition of potassium chloride corrosion readily takes place. It is possible, however, to increase the alkali to such an extent that corrosion is entirely prevented, no matter how concentrated the solution of chloride. The minimum amount of alkali required rises with the percentage of chloride until saturation of the latter is reached.

A curious point about this type of corrosion in alkaline solution is the fact that it invariably takes the form of pitting. Most probably the pitting originates at points where traces of impurity are present. These traces are exceedingly difficult to remove, and are readily found on etching the surfaces of even the purest commercial irons.

These observations demand the serious attention of boiler engineers, inasmuch as weakly alkaline feed

waters are likely to produce serious trouble. It is not difficult to imagine that a large iron boiler might very well lose several pounds in weight through a uniform superficial corrosion and not be seriously affected thereby. Yet if a hole were caused by pitting the effect might be disastrous, even though the total loss in weight were only half an ounce. The remedy in these cases appears to lie in increasing the alkalinity.

Preserving Iron in Concrete

From the foregoing it is evident that the preservation of iron in concrete may be effected in one or more of three ways, namely:

By complete exclusion of air;

By complete exclusion of water;

By rendering the concrete sufficiently alkaline to place it within the inhibiting area.

If the engineer can make his concrete conform perfectly to any one of these conditions he has achieved his object, for the reinforcing metal will not rust.

The following considerations suggest themselves as worthy of careful study:

None of the concrete materials should be too coarse, otherwise thorough mixing and good contact between the different ingredients will not be as perfect as is desirable.

It is essential to press or pun the mixture well into position in order to eliminate voids in so far as is possible.

A sufficient thickness of concrete should be applied to the metal. If too thin the concrete may not be sufficiently impervious or it may crack mechanically and thus admit air and water to the metal.

Stray electric currents must be avoided. If the metal should become anodic, rusting would take place in consequence of the liberation of oxygen, and this, leading to cracking, would rapidly destroy the cement.

Substances likely to contain acids or acid-producing bodies should be avoided.

The concrete may be advantageously coated with some waterproofing material to render it still more impervious, provided such proofing is entirely free from acid or acid-producing substances.

Improving Side-Blow Converter Practice

John H. Hall, metallurgist, Taylor-Wharton Iron & Steel Co., High Bridge, N. J., has invented a process for producing steel in side-blown converters and has assigned the patent, U. S. 1,249,075, to his company. He states that in the ordinary use of such a converter the agitation is much less active than in a bottom-blown vessel which is the cause often of great irregularity in operation results, causing metal or slag to overflow or boil over from time to time, occasioning loss of time and material. This experience has restricted its use, he claims, especially in the treatment of certain materials in which the manganese is relatively high in proportion to the silicon. Mr. Hall claims that his new process overcomes these and other difficulties. He accomplishes this by a certain regulation in the quantity of the slag and the percentage of its constituents formed during the operation, so as to maintain constantly a freely fluid slag, containing approximately 60 parts of MnO to every 40 parts of SiO₂. The letters patent discuss details and special cases in full.

The annual election of officers of the Niles Tool Works Co., Hamilton, Ohio, was held on January 29, and the following officers were re-elected to serve during the ensuing year: President, James K. Cullen; first vice-president, S. D. Fitton; second vice-president, C. L. Cornell; secretary, J. L. Blair; assistant secretary, Miles T. Watts; treasurer, J. B. Cornell and assistant treasurer, L. B. Potter.

Puddlers' wages have been advanced 60 cents per ton by the Burden Iron Co., Troy, N. Y., making the present rate \$11 per ton. This is the fifth recent increase to these workers.

Electric Air Heating Units

The Cutler-Hammer Mfg. Co., Milwaukee, has developed a line of electric air heating units intended to supplement the furnace or steam heating system in



Conservation of Fuel by Supplementing the Regular Furnace or Steam Heating System in Industrial Plants Is the Function of a Recently Developed Line of Electric Air Heating Units

factories and large industrial plants. Various shapes, sizes and capacities of heaters are provided and it is pointed out that it is possible to secure a unit that will fit every space or mounting condition. Among the uses to which units may be put are heating of crane cabs; valves, pump and meter houses; exposed corners or rooms, and in steel plants for keeping shear-men and table men comfortable. The current required for the unit can be carried to inaccessible points by the use of flexible conductors, and as soon as a location is warmed the current supply can be cut off and the heater moved to warm another part of the room or plant if desired. The ease with which the heat may be controlled, it is pointed out, tends toward efficiency in heating and in a number of cases where large generating plants are maintained in connection with industrial establishments and current can be delivered at less than 2c. per kw-hr. the exclusive use of the heating units has been found economical and convenient.

Birdsboro Foundry Increases Capacity

The Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., is constructing extensions to its foundries. One is in the form of an L that will join the iron foundry and steel foundry together. It will consist of an extension 135 x 60 ft. long to the iron foundry building. The extension to the steel foundry will be 70 ft. long, one bay of which will be 50 ft. 3 in. from center to center of rails, and the other 60 ft. Approximately 16,000 sq. ft. more foundry floor space is made available.

In connection with these new bays the company is adding one 35-ton crane and one 10-ton crane, one additional 30-ton open-hearth furnace in the steel foundry and an additional 52-in. cupola in the iron foundry. An outside crane runway for unloading and storing raw material for the iron foundry has just been completed. This runway is 173 ft. long and 50 ft. wide, and is equipped with a 5-ton Shepard monorail for unloading raw material from the cars and charging it direct into the cupola, or storing it under the runway. In connection with this runway, a system of concrete bins for storing sand, coal, coke and scrap has been erected. This extension will give the company almost 3 acres of floor space under one roof, and will increase the capacity of both the iron and steel foundries very materially. It was constructed to meet the company's desire for increased production of iron and steel castings for important naval and ship contracts.

Because of the shortage of tin cans the Wheeling Can Co., Wheeling, W. Va., has been given a permit to operate on heatless Mondays.

A Traveling Argument Against Waste

A novel scheme was decided upon by the Westinghouse Electric & Mfg. Co., to bring home to the employees some idea of the amount of food products and manufacturing material wasted each day in its plant at East Pittsburgh, Pa. A storage battery truck was fitted up as a traveling exhibit and driven up and down the shop aisles. The truck was loaded with a collection of the food wasted by the employees including bread, butter, cake, crackers, pickles, cheese, fruit, etc., as well as copper, zinc, lead, mica, rubber, felt, gum and similar manufacturing materials much of which could be used again to advantage. A large sign was placed over the truck calling attention to the load.

It is estimated that the foodstuffs wasted per day amounted to between \$35 and \$50, the cost of which comes out of the employees' pockets. The waste of the manufacturing material runs into hundreds of dollars daily and would be a total loss to the company were it not for the fact that a force of men is continually em-



A Storage Battery Truck with a Load of Wasted Food and Manufacturing Material Is Employed in a Large Industrial Establishment as an Argument against Waste

ployed assorting this apparently scrap material and either turning it back to the stockroom for use in the plant or classifying it so that the highest price may be obtained for it as scrap.

German Basic Bessemer Plants

According to an article in *Zeitschrift des Vereins Deutscher Ingenieure* by Hubert Hermanns, dealing with basic Bessemer plants in Germany, in all up-to-date plants the converters are arranged with their centers in a straight line. One advantage of this arrangement is that the number of converters can be increased without in any way interfering with the system of working. With converters of 20 to 25 tons capacity their distance apart is never less than about 33 ft. In the case of a 24-ton converter the bottom has 220 holes of 15 mm. (0.06 in.) bore. The bottom plug is slightly coned, its diameter being 5.91 ft. at the top and 6.23 ft. at the bottom. In some cases the outer shell is not riveted together but entirely welded.

The Federal Homes Corporation, Jersey City, N. J., has been incorporated with a capital of \$2,000,000 to build dwellings and housing accommodations for the new industrial plants on the Kearny meadows, near Newark. It is proposed to commence the early erection of buildings for the employees of the Federal Shipbuilding Co., the Foundation Co., Ford Motor Co., and other organizations now building or operating in that section. Charles L. Decker and J. Harry Miller, Jersey City; and Herbert Green, New York, are the incorporators.

Electric and Converter Castings Compared*

Results from Acid Single Phase Furnaces—Electric Steel in Nor- mal Times Has Slight Advantage

BY C. R. MESSINGER

THIS paper represents what has been done in fairly well operated foundries and not what the designers of electric furnaces think ought to be or can be done. The following remarks are not written with the idea of presenting anything new on the subject of the electric furnace, but rather to give some figures and facts based on about 13 months' operation on one furnace and 15 months on another. From the first furnace during this period 2029 heats have been taken, and from the second furnace 2436 heats. The furnaces referred to are single-phase, bottom-electrode furnaces. They have been run on an acid lining except for a period of approximately one month, when one furnace was run basic.

In the writer's opinion, it is going to be very difficult if not impossible, to obtain satisfactory results from basic operation with this type of furnace. The single-phase bottom-electrode furnace operates with a long arc, which means high voltage. The heavy slag in basic practice refracts the heat from the long arc to the roof and side walls and causes them to melt in a very short time. The chief difficulty, however, is encountered in putting in a bottom of dead burnt magnesite or dolomite. These should be sintered, and with a water-cooled bottom electrode this operation presents some difficulties. The electrode referred to is so placed that it projects through the magnesite, but cannot be used to form an arc with the top electrode to burn in the bottom for the reason that the bottom electrode is metal and thus easily melted. Should the electrode be melted too far, the water chamber would be exposed and the results would be disastrous. It may not be fair to state that it is practically impossible to run basic with this type of furnace, but these were the conclusions reached after a month's trial on one furnace.

Average Charge Over One Ton

The furnaces described are called one-ton furnaces, but very rarely is there less than 2300 lb. charged and for periods of a month at a time charges weighing 3000 lb. have been used. The average charge for the furnace making 2029 heats is 2529 lb. and that of the furnace making 2436 heats is 2780 lb. An average charge on the first furnace is about as follows:

	Pounds
Contact plug	25
Shop scrap, 50 per cent of which is heads and gates from converter castings	1,200
Shrapnel ends or axle butts	500
Structural punchings	350
Forging scrap, including flashings	300
Turnings	100
Total	2,475

The average additions per heat have been about as follows:

	Pounds
80 per cent ferromanganese	19.5
Ore	20.0
50 per cent ferrosilicon	13.5
Aluminum	1.0
Total	54.0

With this charge, steel can be made which will meet any specifications that the ordinary foundry has to contend with. The final chemical analysis, of course, can be varied by the final additions. The point which the writer is trying to bring out is that with the grade of scrap such as can be bought in any market, it is possible to produce results satisfactory from a chemical and physical standpoint on an acid lining.

During a period of 24 hr. it has been impossible to

melt and pour 12 such heats. Eleven heats during the same period are not unusual, but the best 30-day period shows an average of 9.24 heats per 24-hr. The melting time is approximately 2 hr. and 15 min. The average charging time is 10 min.

Average Labor Cost

The average labor cost on a furnace of this type is \$2.10 per net ton of steel melted and this figure covers bringing in the scrap from the yard, and as all repairing is done by the melters and helpers, this item is also included. The crew on the day shift consists of one melter, one helper and one man carrying scrap. The latter brings in enough scrap during 12 hours to supply the night shift also, so the night crew consists of one melter and one helper.

The consumption of electrodes on the furnace making 2029 heats in 13 months was an average of 5.15 lb. per ton of steel melted. In arriving at this figure breakage and a considerable amount of poor practice has been included. As graphite electrodes are worth approximately 13c per lb. at the present time, the much-talked-of electrode cost amounts to less than 70c per ton of metal melted.

The cost which is generally considered first by the foundryman when considering the installation of an electric furnace is that of electric power used. This, of course, will vary according to the power rate and the kind of castings to be poured. The furnace described is used to pour very small castings with an average weight of less than 4 lb.; therefore, the furnace is not tapped until the metal is very hot and the power is left on longer than it would be in most foundries. The power consumption has averaged 635 kw.-hr. per net ton of steel melted since installation. This figure is high for later practice and a figure of 570 kw.-hr. can easily be made.

The refractory cost is more dependent upon practice than any other item, but, even so, with ordinary skill can be fairly well controlled. Since the melters have begun to appreciate the power behind the furnace, and eliminating the first nine roofs, the remainder show an average of 368 heats per lining. This resolves itself into a refractory cost of 7.8c per ton. Labor is not included in this figure, as it has been included in the melting cost of \$2.10 per net ton melted.

Continuous Operation

Practically continuous operation can be maintained as the furnace does not have to be repaired oftener than once in six weeks, and by arranging for the shut-downs to come on Sunday, repairs can be started late Saturday and the furnace be put in shape to run again by Monday noon with an entire new lining and roof. The maintenance of the electric equipment amounts to practically nothing and consists principally in keeping the switches clean.

It has often been stated that anyone could run an electric furnace and this, of course, is not true, as it requires a man with a good knowledge of metal. Of the four melters on these two furnaces two of them were converter blowers at the time the electric furnaces were installed. Any man with a good knowledge of metal can be taught to run an electric furnace in a very short time.

The writer has touched on practically all of the items of cost which enter into making electric steel. It is apparent that the greatest variation in cost of making acid electric steel will come from the purchase price of scrap. However, the classes than can be used are so numerous that a reasonably low-priced mixture can be obtained in any foundry center. The reason for the

*From a paper presented at the annual meeting of the American Foundrymen's Association in Boston, Sept. 25, 1917. The author is first vice-president Stryer Steel Casting Co., Milwaukee, Wis.

miscellaneous mixture previously given is primarily to obtain a uniform analysis, as by using a number of different grades, when one car is finished, the substitution of a new car does not materially change the analysis. However, the question of the selling price of various grades of scrap has been taken into consideration in making up the mixture.

The power cost is next in importance as an increase in the power rate of $\frac{1}{4}$ ¢ per kw.-hr. will show an increase in the cost of castings of \$2.65 a net ton, using a casting yield of 60 per cent and the average kilowatt-hour consumption mentioned above. The plant with a rate of $\frac{3}{4}$ ¢ per kw.-hr. will have an advantage of very close to \$8 a ton in the cost of finished castings over the plant with a rate of $1\frac{1}{2}$ ¢ per kw.-hr. The rate which the power company gives is important, but it is just as important, if not more so, that the central station be equipped to handle the load properly and give continuous service. It seems to work out in practice that the central station which does not have an excess of power cuts off the electric furnace load first when conditions arise where enough power cannot be furnished to meet all demands. It is also important that the rate be based on some schedule so as to give the plant the advantage of a lower rate when it furnishes a power company with a larger and more continuous load. In other words, a plant should have some consideration in rate for continuous operation to offset the disadvantages of night pouring.

The labor cost, the maintenance, the electrode and refractory cost should be approximately the same in all localities.

Converter and Electric on Small Work

The operation of the furnaces mentioned, one of which is run in conjunction with the side blow converter, shows that better foundry results are obtained in pouring small work with electric steel rather than converter steel. While it is possible to obtain any degree of temperature this side of the melting point of silica brick in the electric furnace, it is not difficult to obtain an even temperature over a number of heats. In pouring large work the advantage is not so apparent, but it very often happens that when the foreman has a large intricate casting to pour, one which might crack, he frequently requests that it be poured in electric steel. This is not an important fact, but it shows the attitude of the men who are dealing with both kinds of metal day in and day out.

Cost of Electric Steel in Normal Times

The present market price of low-phosphorus pig iron is such that a comparison of costs between the electric furnace and the converter is of little value. However, foundrymen are interested in the subject, as it has been claimed that the electric-furnace metal in normal times could be produced at a much lower cost than converter steel and as cheap as open-hearth steel. Enough figures have been compiled to show that in normal markets this statement is not entirely correct. Using the normal price of low-phosphorus pig iron, scrap, coke and a power rate which can be obtained in most large cities, the figures show that the electric furnace has a slight advantage so far as costs are concerned when compared with the converter. In making this comparison, the high original cost of the electric furnace has been kept in mind and the question of investment and depreciation has been considered. The comparative figures are so close that were the pig iron used in making the comparison put on an f.o.b. Philadelphia basis, the slight advantage would be with the converter.

A fact which may have a bearing on this subject in the future is that a present low-phosphorus pig iron is being produced in this country at a rate of 560,000 tons per year, whereas the production prior to 1915 was approximately 300,000 tons. It is just possible that this increased production will in normal times eliminate part of the premium that has been paid for low-phosphorus over Bessemer iron. A change in conditions such as this would bring the two methods practically on an equal basis.

The situation sums itself up that the farther west

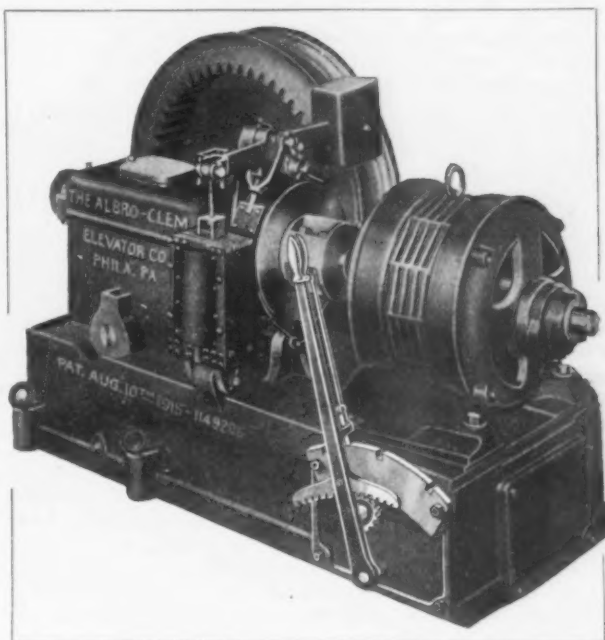
a plant is located the better comparative cost the electric furnace will make because of the freight rate on low-phosphorus pig iron and that there are certain points in the east where the question of an installation of an electric furnace rather than a converter would have to be determined on the basis of whether or not there was any difference in the quality of the metal produced.

One of the furnaces referred to in this paper is operating in the plant of the Sivyer Steel Casting Co., Milwaukee, and the other in the plant of the Electric Steel Co., Chicago.

A Small Worm-Driven Electric Hoist

A 1-ton worm-driven electric hoist embodying several interesting features in its construction has been brought out by the Albo-Clem Elevator Co., Philadelphia. It is designed primarily for the stacking of miscellaneous material in warehouses with the aid of unskilled labor. The outstanding features include the use of a single-lever type of control and ready portability.

The hoist is designed to be put in service close to the point at which the work is being done, and it is pointed out that no special preparation is required as the power for the motor can be secured from the near-



Single-Lever Control Enables Material to Be Handled Readily by a 1-Ton Worm-Driven Electric Hoist Receiving Its Power from the Nearest Electric Light Socket

est electric outlet through the medium of a flexible cable equipped with a standard attachment plug. It is also possible to skid the hoist or to place it on a truck and thus move it around the plant quickly and at a low cost, thus increasing the radius of action.

The starting, stopping and reversal of the motor, which may be of any standard type, depending upon the conditions of the available power supply, are regulated by a single lever. Moving this lever in one direction supplies current to the motor and causes the load to be hoisted, while in the position at the other end of the quadrant, the motor operates in the reverse direction. When it is desired to stop the hoist the operating lever is brought to the neutral position and this serves to set the brake automatically as well as cutting off the current supply.

A white metal, which takes a brilliant polish and holds it on exposure to the atmosphere, is claimed to be possessed by an alloy of bismuth, mercury, tin, zinc, and copper covered by a patent (U. S. 1,248,925, Dec. 4, 1917) granted to Henry K. Sandell, Chicago, Ill., assigned to Herbert S. Mills of the same city.

EVOLUTION OF CABLE MAKING

Early History in England—The Continuous Wire Rod Mill—American Suspension Cables

THE development of cable making in England was recently discussed in an interesting manner, largely historical, by J. Phillips Bedson before the Manchester (England) Association of Engineers, in a presidential address. There were interesting allusions to the industry in America in its early days. An abstract by the London *Ironmonger* follows:

Puddled iron was formerly used in the wire trade for all common purposes, such as a low-grade telegraph wire, armor for submarine cables, and fencing; but for the higher grades at this time English and Swedish charcoal irons were required. The former was made in the South Staffordshire district and in Shropshire, and the latter in Sweden, in what was known as a Lancashire hearth. It was imported into this country in blooms, billets and wire rods. In 1850 the first experiments in submarine telegraphy were made by the laying of a cable between Dover and Calais, and from that date the wire trade found an ever-increasing demand for its product. Before long the idea of an Atlantic cable was mooted, and in 1856 the Atlantic Telegraph Co. was formed. An unsuccessful attempt was made to lay such a cable in 1857 with wire which was drawn from Bradley rods in a Manchester works. Mr. Bedson traced the steps that led to a successful issue.

The speaker stated that the wire industry in America would always be intimately associated with the name of John A. Roebling, who built the first two wire bridges in the United States. The wire for these was drawn at Manchester. One bridge was at Cincinnati, the suspension cables weighing 500 tons, the breaking weight being 6500 tons, and the diameter of each 12½ in.; each cable was composed of 5200 wires and was 1760 ft. long. The other was the Niagara Railway Suspension Bridge, at Niagara Falls. Both were made of charcoal iron, and they set the type for the graceful wire bridges which span the East River between Brooklyn and New York to-day. The Cincinnati bridge is still in use, but the Niagara Bridge, which was erected in 1855, was replaced in 1897 by a new bridge to meet the increased traffic. Each of its four cables contained 2640 parallel wires 0.145 in. diameter, making a total strength of 11,996 tons, on a basis of 1648 lb. for each wire. The actual strain in the bridge at the towers was 6180 tons, which corresponded to a factor of safety of 4.41. This increased at the center of the span to 7.83. During its 42 years of service it had been subjected to increased loads, so that the final strains were considerably in excess of those given. When the cables were taken down the wire was tested, and the average of 12 tests showed an ultimate of 1566 lb. for one wire, which was equal to 42 tons per sq. in., or 95 per cent of the original strength. Such was the care of the cables that the wires were almost as bright when taken down as when first thrown over the river.

This early work was done with comparatively small wire rods, which were put up in 14-lb. coils. Obviously some better method of manufacture was the next stage to be tackled, and the difficulties were solved when in 1862 the late George Bedson was granted a patent for a continuous system of wire-rod rolling mill, whereby rods were rolled in 1-cwt. pieces. That result had since been increased to 3 cwt. in one continuous length. There were three patents in his mill, covering three leading features:

The door of the heating furnace, which was placed immediately in front of the first pair of rolls so that the heated billet when placed in this first pair of rolls would draw the remaining length out of the furnace.

The placing of the rolls, 16 in number, in a line, so that No. 1 roll delivers into No. 2, and so on through the remaining 14 rolls, each roll being graduated in increased speeds to suit the acceleration of the reduced size of the billet as it progressed down the mill, where the outgoing round rods were coiled up on suitable reels. This idea was suggested to Mr. Bedson by the drawing frame of textile machinery.

The twisted guide, where needed, to present the partly rolled

rod to the succeeding pair of rolls, although this was only required once in the first mills in rolling iron.

The rolls in the original mills were placed horizontally and vertically alternately to give the requisite compression on top and sides. An experimental mill erected in the Adelphi, Salford, in 1863 proved a success and it was then removed to the Bradford Ironworks, Manchester, where it ran until 1884. A second mill was built in 1866, part of which is running to-day. In 1867 a duplicate of that mill was built for Washburn & Moen, of Worcester, Mass.

Pyrometers and Pyrometry

In a communication from S. A. Main, chief chemist at the works of Hadfields, Ltd., read at the meeting of Faraday Society held on Nov. 7 in London, it was pointed out that considerable intelligence was required in the use of pyrometers since they might vary not only in themselves but also to the manner in which they were used. Constant supervision was required and while an ordinary workman might be trained to use the instrument according to specific instructions the care and responsibility must be placed in the hands of one of the staff with a proper knowledge of the principles involved. In this way it was possible to choose the instrument best suited to the work, keep it in calibration and use it to secure accurate results. He advocated the use of the Le Chatelier's original platinum and platinum-rhodium element. Even at the present high prices he stated that this couple paid for itself in the regularity of the heat-treated products. He advised against the use of portable pyrometers and recommended that a separate instrument be provided for each individual furnace or group of furnaces. Moving the instrument about the works does it no good at the least, and further the calibration varies with the surroundings and the leveling.

His experience with radiation pyrometers was not particularly favorable due to the conditions in a steel-works being hardly suitable for their employment. He criticised the inherent time-lag in taking readings as well as the unequal heating of the instrument by radiation from the furnace which affected the zero point. He recommended the use of polarizing type of optical pyrometer, as with it a reading could be obtained as soon as the operator made the adjustment and it also had the advantage of possessing a definite physical law which might be expressed mathematically and serve to facilitate and check the calibration. While it was possible with the same amount of care to get equally accurate results from the disappearing-filament type, the latter required a certain interval of time to enable the filament to acquire the temperature corresponding to the current which was passing through it. In conclusion Mr. Main commended the Brown control pyrometer which was illustrated in THE IRON AGE, Dec. 20, 1917, and pointed out the need for a good recording optical pyrometer.

Goldschmidt Companies Consolidated

The Goldschmidt Detinning Co. and the Goldschmidt Thermit Co. have consolidated as the Metal & Thermit Corporation, with general offices at 120 Broadway, New York. These two companies have been practically combined for the last two years and have occupied joint offices. The detinning department of the Metal & Thermit Corporation will carry on the recovery of tin from tin scrap. Approximately 100,000 tons of tin scrap is treated yearly and the equivalent of 2000 gross tons of metallic tin is recovered. The thermit department will continue the production and sale of thermit welding materials and apparatus as well as the various carbon-free metals and alloys which are produced by the aluminothermic process. The process was first introduced in the United States in 1902.

The following are the officers and directors: W. T. Graham, Edgar L. Marston, Daniel G. Reid, F. S. Wheeler, Hubert E. Rogers, F. H. Hirschland, E. L. Ballard, L. A. Welles, Charles F. Dane, Philipp Gensheimer, Fred W. Cohen.



The Empty Shell Cases of the 75-mm. Shells Are Collected from the Battlefields and Taken to the Rear, Where They Are Sent to the Munitions Plant to be utilized Again by Remelting and Otherwise. Chinese laborers are replacing the French soldiers who formerly did this work. There are now more than half a million Mongolians serving as common laborers behind the fighting front. Reproduction of a French official picture at Toulon, France, received from the Committee on Public Information, Washington, D. C.

SALVAGING WAR'S WORK

PROFESSIONAL UNITY

Ohio Technical Societies Formed at Columbus Meeting

Enthusiastic desire to bring about professional unity in the State of Ohio was the outstanding feature of the conference of Ohio Engineering Societies held at Columbus, Jan. 29. The meeting resulted in the formation of a permanent organization christened the Association of Ohio Technical Societies, with Clyde T. Morris, professor of civil engineering of Ohio State University, as president and C. E. Drayer of Cleveland as secretary. All local societies and local sections of the national societies in the state, 12 in all, were represented, except one which has since indicated its desire to be included, so that the representation now includes all.

Delegates numbering 20, representing 10 societies, gathered in the library building of the University and, after a delegate from each society had told something of the strength and activities of the organization he represented, settled down to a discussion of the subjects proposed in the call. In the discussion of the general subject of co-operation and the organizations to be included in the state association, the opinion was expressed by the representative of the Columbus Chapter of the American Institute of Architects that the work of both architect and engineer would be improved if each made use of the special training of the other.

Resolutions were adopted endorsing the 10 cardinal principles adopted by the Committee on Engineering Co-operation at its conference last March; urging local societies to endeavor to have at least one engineer named on any board having to do with the expenditure of public funds where engineering experience would be of assistance; and endorsing the report of the Inter-society Relations Committee of the Cleveland Engineering Society suggesting that the national societies consider as a prerequisite to membership that a candidate show membership in an accredited local society. Em-

ployment, participation in civic affairs and statutory regulation of engineering practice were discussed, the last at length. With reference to employment, the consensus of opinion was that the employment problem is partly local and partly national in its character. It was felt that there should be an employment service national in character conducted by the profession and without profit.

All delegates seemed to recognize that regulation by law of the practice of engineering is coming and that if engineers do not recognize this situation and do the lawmaking themselves, somebody else will.

Various questions discussed and others will be placed in the hands of committees for working out after the societies constituting the conference have heard the reports of their delegates and approved the central organization.

Chemistry in the War

Adequate chemical control of manufacturing plants engaged in the supply of war material is now receiving the careful consideration of the War Department. Provision has now been made through an order of the Adjutant General of the Army by which manufacturers of material necessary to the prosecution of the war, who have lost the services of chemists through the first draft, may again obtain the services of these men for war work. It is announced also that provision has been made by which manufacturers threatened with the loss of their trained chemists in the present draft may retain these men. Detailed information will be furnished to manufacturers by the Chemical Service Section, N. A., New Interior Building, Washington.

William H. Barr, president Lumen Bearing Co., Buffalo, addressed the Business Men's Club of Cincinnati, at a dinner Wednesday evening, Feb. 6, and motion pictures were shown of the operations at the company's works. A quartet sang patriotic songs.

Mobilizing Labor for War Purposes

Co-ordinating Plan of Council of
National Defense Approved by the President
Being Installed by Department of Labor

A COMPREHENSIVE project, designed for the mobilization of labor for war purposes and its standardization in all the industries engaged on war work, has been developed by the Council of National Defense, approved by the President, and is now being installed under the supervision of the Secretary of Labor. It is the chief purpose of this organization to provide an ample supply of skilled labor for ordnance plants and the shipyards. Generally speaking, the aim will be to utilize the entire labor supply of the country so that there shall be neither a serious shortage nor an important surplus in any part of the country or in any special industry.

The President on Jan. 4, in a memorandum transmitted to the Secretary of Labor, formulated the war needs of the Government as follows:

- (1) A means of furnishing an adequate and stable supply of labor to war industries. This would embrace, (a) a satisfactory system of labor exchanges; (b) a satisfactory method and administration of training of workers; (c) an agency for determining priorities of labor demand; (d) agencies for dilution of skilled labor as and when needed.
- (2) Machinery which will provide for the immediate and equitable adjustment of disputes in accordance with the principles to be agreed upon between labor and capital and without stoppage of work. Such machinery would deal with demands concerning wages, hours, shop conditions, etc.
- (3) Machinery for safeguarding conditions of labor in the production of war essentials. This to include industrial hygiene, safety, women and child labor, etc.
- (4) Machinery for safeguarding conditions of living, including housing, transportation, etc.
- (5) Fact gathering body to assemble and present data collected through various existing governmental agencies or by independent research to furnish the information necessary for effective executive action.
- (6) Publicity and educational division which has the function of developing sound public sentiment; securing and exchange of information between departments of labor administration; and promotion in industrial plants of local machinery helpful in carrying out the national labor program.

The shipbuilding industry has been brought conspicuously into view because of the extraordinary wage policy adopted by the United States Shipping Board, which has undertaken to outbid all other employers, public and private, and without any attempt at standardization of rates has instituted wage scales so high as not only to demoralize the labor market in the vicinity of all the shipyards of the country, but also to induce the idling of employees to such an extent as to reduce their efficiency from 30 to 50 per cent.

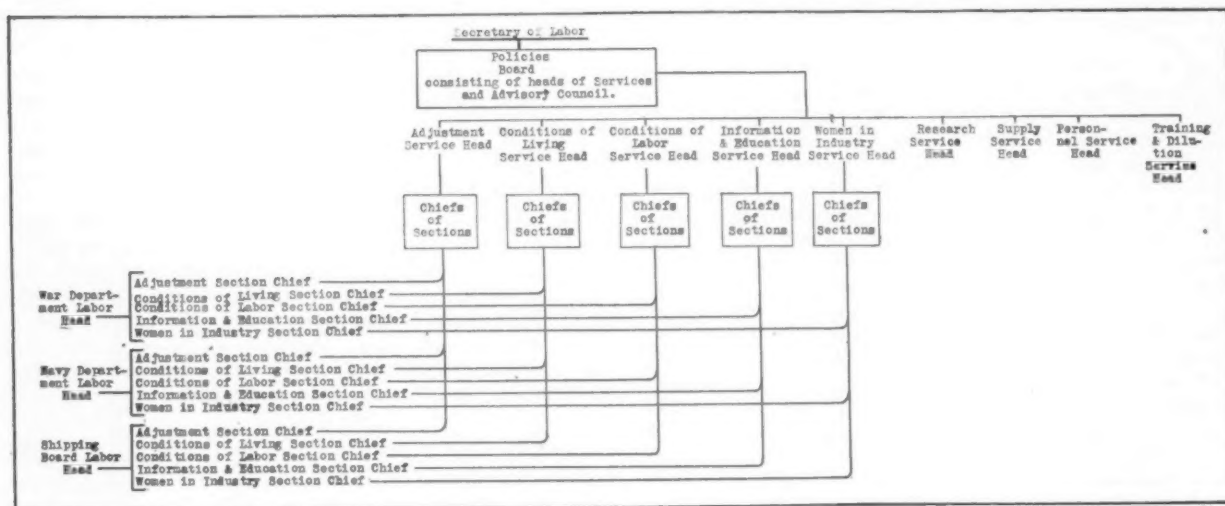
The general outline of the administration of the new work is as follows:

- An Adjustment Bureau to deal with industrial disputes.
- A Conditions of Labor Bureau to administer conditions of labor within business plants.
- An Information and Education Bureau to promote sound sentiment and to provide appropriate local machinery and policies in individual plants.
- Women in Industry Bureau to correlate the activities of various agencies dealing with this matter.
- A Training and Dilution Bureau.
- A Bureau of Housing and Transportation of Workers.
- The United States Employment Service.
- A Bureau of Personnel (which may possibly be fused with the Information and Education Bureau).
- Other bureaus already established in the Department.

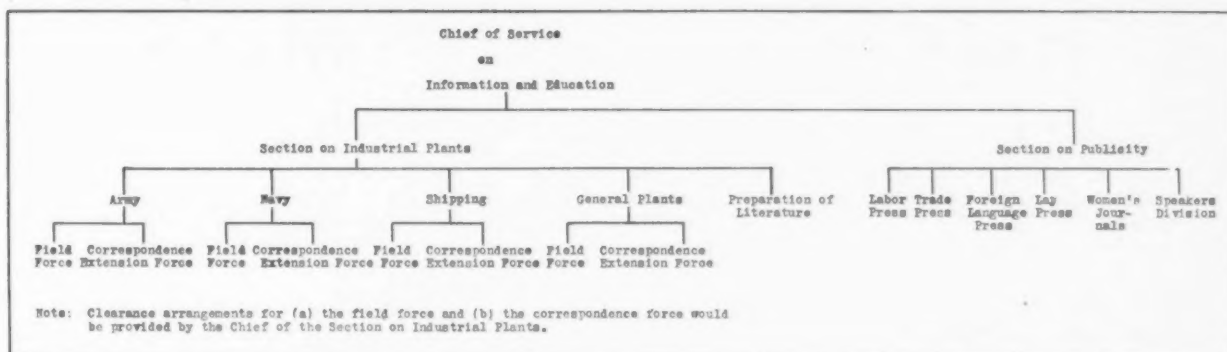
This general scheme involves the continuance of such agencies as the industrial service sections of the Ordnance Department and of the Quartermaster Corps of the War Department, of the Shipping Board and of such other bureaus as are now engaged in organizing these sections. All the facilities thus established are to be utilized, but their activities are to be centered in controlling bureaus of the Department of Labor.

Referring to the general chart reproduced herewith, which presents a general view of the organization but omitting details, it will be seen that administration is centralized under the Secretary of Labor. He would for this purpose have his policies board made up, according to the character of the problem up for discussion of his advisory council, of the heads of the industrial service sections of other departments and the heads of the bureaus within his own department. The industrial service sections of other departments are to be organized, according to their needs, on the same general scheme that governs the organization of the new labor administration. To some extent this has already been accomplished with some differences of terminology, which may easily be standardized hereafter. The chiefs of the various sub-sections of the industrial service sections of other departments will clear their activities through the appropriate bureau head of the Department of Labor and they will thus become chiefs of sections under these bureau heads and, together with such other chiefs as it may be necessary to appoint, will form the policies board of the particular bureau head affected.

The other chart is designed merely as an example of the organization of any given bureau and is typical of the ramifications to be expected and the manner in



Centralizing Scheme of Labor Control with Details Omitted



Typical Example of the Ramifications of Labor Control of a Given Bureau

which all activities are finally controlled by the organization under the Secretary of Labor. In setting forth the advantages of this system of organization the Council of National Defense, in a memorandum which the President has approved, says in part:

It will be possible to get under way with the new administration much more rapidly if existing agencies are utilized than it would be if they are supplanted. Promptness in getting under way is desirable both as a means of deserving the confidence of other departments of Government and as a means of facilitating the successful conduct of the war.

The departments of Government which have set up or which may set up industrial service sections have entered into contracts with various firms. In many cases these contracts are so drawn as to give these departments a very considerable control of the conduct of the plants. This is particularly significant in the case of labor matters. More efficient action in dealing with these firms on labor matters can, of course, be secured by the contracting departments than by some other department.

These industrial service sections are rapidly acquiring an efficient personnel. It is not too much to say that they are combing the country for the best men in certain lines. It will be much easier to retain this personnel in the existing organization than it will be to transfer it to another, and the personnel problem is a very serious one in labor administration.

It will be much easier to get appropriations for the new labor administration through Congress on the basis of correlation of existing agencies than it will be on the basis of an absolutely new start. Army, Navy and shipping have, within reason, unlimited funds, which can be applied for this purpose. For example, the ordnance bureau alone expects to have between 300 and 400 employees in its industrial service section. If these other departments will carry the expenses involved in their industrial service sections, it will make possible a request from Congress for a much smaller sum than would be necessary if everything were to be merged in the Department of Labor.

Quite aside from their industrial service sections, as such, these other departments have in their inspection forces a large personnel which can be used, and indeed is being used, in labor administration. For example, in the ordnance department, their inspectors make daily or semi-weekly or weekly reports concerning conditions of living, conditions of labor, labor turnover, etc. These inspection staffs could not be used to as good advantage if the administration of labor were divorced from the administration of production.

The system of control charts established by such bureaus as ordnance furnishes accurate data on which administrative action may be taken, in that these charts make possible the determination of the precise character of difficulties which arise in industrial plants. It is not too much to say that very heavy expenditures by an agency outside of these production departments could not secure as accurate information concerning conditions as can be secured in ordinary administrative routine within the production department itself. This is only another way of emphasizing the fact that we must think not in vague terms of "labor" but in terms of "labor in production."

The plan proposed accords with generally approved theories of business administration. It secures the necessary centralization of control together with the wise decentralization of administration by agencies which come into direct touch with the problems at issue.

It is highly significant that in approving this project for the general control of labor the President should have indorsed a suggestive comment with which the Council closes its recommendations emphasizing sharply the fact that it is useless to centralize the con-

trol of labor without at the same time centralizing all other factors of production.

"The foregoing memorandum," says the Council in conclusion, "blocks out in outline form the result of the deliberations to the present time of your Advisory Council on the six matters laid before it in response to the presidential order of Jan. 4, 1918. In a sense, the function of your Advisory Council does not extend to the consideration of other matters. We should, however, be neglectful of our full duty in the case did we not point out that a perfect administration of labor matters in accord with the plan outlined above would not be sufficient to meet the emergency which faces the country.

"Labor matters do not stand by themselves. They are phases of production, and no centralized administration of labor can be adequate which does not go hand in hand with the centralization of administration of production. How this latter centralization is to be accomplished is not for your Council to consider, but its judgment is clear that failure to secure such centralization spells failure to secure a sound situation in labor, and failure to prosecute the war vigorously."

W. L. C.

Illness in Industry

Records kept by companies which make health in industry the subject of careful inquiry show that time lost by employees from sickness is four to ten times that lost by industrial accidents, according to an analysis of this subject to be presented at the New York meeting of the American Institute of Mining Engineers, Feb. 18-22, by Dr. Thomas Darlington, secretary, welfare committee, American Iron and Steel Institute. The author has emphasized that illness as well as accident is a source of permanent disability among workingmen, and that some day illness prevention will become as essential from the standpoint of operating costs as accident prevention.

In considering fatigue, he points out the important bearing that personal cleanliness of mouth, hands and body have on the worker's value to his employer. The physiological causes of fatigue, such as fermentation of food due to spoiled box lunches, poisoning from unclean or decayed teeth, indigestion caused by fermentation of food or hasty eating, and the inability of the body to throw off normally the waste products of muscular effort, are all set forth in detail. The startling prediction is hazarded that eventually every worker will be required to wash his hands and brush his teeth before the noon meal as a fatigue prevention measure.

A résumé is also given of the many and extensive installations for the workers welfare now approved of by the iron and steel industries on economic grounds.

For several years the forge department of the Davis Sewing Machine Co., Dayton, Ohio, has grown very rapidly. An addition to the plant which provides 25,000 ft. of floor space is now completed and equipped. The company handles a wide variety of forge work, including automobile parts. At the present time it is working on a large contract for aeroplane parts.

Effect of Copper in Medium-Carbon Steel*

High Copper Content as Compared with
Low Renders the Steel Superior in
Strength, Hardness and Shock Resistance

—BY CARLE R. HAYWARD AND ARCH. B. JOHNSTON—

BEFORE modern testing methods had been developed, blacksmiths noted red shortness in iron, the cause for which was ascribed to the presence of copper. Numerous papers have been published on the corrosion of steels containing various amounts of copper and a few writers have discussed the effect of copper on the mechanical properties of steel.

The purpose of this investigation was to obtain additional data on the mechanical properties of medium-carbon steel containing small quantities of copper.

Among those who have published results of mechanical tests on copper steels are E. J. Ball who states that copper increases the tensile strength and hardness but lowers the elongation. J. E. Stead states that copper steels closely resemble nickel steels containing equivalent percentages of nickel as regards tensile strength, resistance to shock, corrosion and hardness. F. H. Wigham found that copper in small amounts had no injurious effects on steel. P. Breuil found that with 1 per cent carbon, copper lessened the brittleness of steel and in low-carbon steel it increased the tensile strength and lowered the ductility slightly. H. H. Campbell states that copper up to 0.25 per cent slightly raises the elastic limit, elongation and reduction of area.

It will be noted that all the above writers agree that copper increases the tensile strength, but they disagree in regard to the ductility. There is little to be found on resistance to shock.

Materials Used in This Investigation

The steels used were obtained through Frank D. Carney of the Pennsylvania Steel Co. They were furnished in the form of forged bars about 1 in. sq. in cross-section and of varying lengths. There were three bars of one composition marked No. 41, 42 and 43 and four bars of another composition marked Nos. 51, 52, 53 and 54. The chemical analyses furnished with the steel are given in Table 1.

Table 1—Composition of Steels Used

	Nos. 41, 42, 43 Per Cent	Nos. 51, 52, 53, 54 Per Cent
Carbon	0.380	0.365
Phosphorus	0.012	0.053
Manganese	0.570	0.590
Sulphur	0.030	0.048
Copper	0.860	0.030

It will be noted that the analyses vary only slightly except in phosphorus and copper and it is probable that the effect of phosphorus will be neutralized by the slight difference in carbon. Although 0.86 copper is not in general considered high, for the purpose of designating the steels in this paper, the first will be called high-copper and the second low-copper.

Preparation of Specimens

The bars were first cut to 7½-in. lengths. The cutting was done with an ordinary reciprocating mechanical saw. Three of the bars gave five specimens each, while the fourth bar, which was somewhat longer, yielded six specimens. This made a total of twenty-one 7½-in. specimens of low-copper steel. Each of the other bars yielded seven specimens, making a total of twenty-one 7½-in. high-copper specimens. The bars were now square, but as this form was not the most favorable for heat treatment, it was decided to turn them down round, on a lathe, in order to obtain the most uniform heating in the furnace. As the threads for the tensile specimens would eventually have to be cut on a ¼-in. round

bar, it was decided to turn the 42 specimens down to this size prior to treatment. The steel as forged was fairly soft and turned very easily on the lathe. There was no noticeable difference in the speed of cutting, between the high- and low-copper steels.

The Heat Treatment

Three specimens of high-copper and three specimens of low-copper steel were taken for each test and in order to eliminate possible differences in the bars no two specimens in a set were taken from the same bar except in one or two instances. There were seven different heat treatments, and in order to identify the specimens the numbers 1 to 7 were prefixed before the original number of the bars. Table 2 gives the numbers as finally stamped on the specimens.

Table 2—Numbers Used in the Bars

Section	High Cu	Low Cu
(1).....	141,142,143	151,152,153
(2).....	241,242,243	252,253,254
(3).....	341,342,343	351,352,353
(4).....	441,442,443	452,453,454
(5).....	541,542,543	552,553,554
(6).....	641,642,643	651,652,654
(7).....	741,742,743	751,752,754

The six bars of section (1) were reserved for tests without heat treatment. The remainder were treated as follows:

The bars under section (2) were heated to 765 deg. C., the switch was pulled, and the final temperature rise registered due to residual heat was 865 deg. C. The bars were allowed to cool in the furnace over night, and removed next morning.

The bars under section (3) were heated to 765 deg. C., the switch was pulled, and the final temperature attained due to residual heat was 860 deg. C. They were then removed and set inclined against a brick on the cement floor to cool in air.

The bars under section (4) were heated to 765 deg. C., the switch was pulled, and the final temperature attained due to residual heat was 845 deg. C. They were removed from the furnace and dropped into buckets of cold water.

The bars under section (5) were heated to 765 deg. C., the switch was pulled, and the final temperature attained was 865 deg. C. They were removed and quenched in water. Then they were replaced and drawn at 360 deg. C., again removed and quenched in water.

The bars under section (6) were heated to 765 deg. C., the switch was pulled, and the final temperature attained was 860 deg. C. They were removed and quenched in water; then replaced and drawn at 455 deg. C., and finally removed and quenched in water.

The bars under section (7) were heated to 800 deg. C., by mistake, the switch pulled, and the final temperature attained was 900 deg. C. They were removed, quenched, and then drawn at 580 deg. C., and quenched in water.

Preparation of Test Specimens

After heat treatment there were 42 bars ¾ in. in diameter, and 7½ in. long. Thirty-six of these were sawed up into three pieces, 4 in., 2½ in., and 1 in. long. The six bars under section (4) (quenched at 845 deg.), were found to be too hard to saw, and in order to cut them up a thin alundum wheel had to be used. As the wheel was in poor condition, the process took about 4 hr. per bar, so only one high- and one low-copper specimen from this section were cut for tests.

The 1-in. lengths were set aside to be polished on the ends for microscopic work, scleroscope tests, and Brinell hardness numbers.

The 4-in. lengths were turned into standard test specimens 0.505 in. diameter and 2-in. gage length with threaded ends. The bars to be tested as quenched were too hard to turn on a lathe. A 7-in. length was therefore used and the ends annealed in a blacksmith's forge to allow

*From a paper to be presented at the New York meeting, Feb. 18 to 22, of the American Institute of Mining Engineers. Mr. Hayward is assistant professor of mining engineering, Massachusetts Institute of Technology, and Mr. Johnston is a graduate student of the same institute.

the cutting of the threads. During the heating, the center was kept cool with water. A 2-in. gage length was then ground at the center of the bar.

The 2½-in. lengths were ground down into small rectangular bars 0.395 in. square, and 2 in. long, with a slot cut half way through in the middle of the bar. The slot cutter gave a slot 1 mm. wide.

In the tensile tests readings were taken of its yield point, ultimate strength, reduced diameter and elongation in 2 in. The yield point was determined by watching for the drop of the beam and in a few cases by measuring with calipers the change in elongation under equal increases of load. The average results are given in Table 3.

Table 3—Average Results of Tests on the Heat Treated Bars

Treatment	Yield Point, Lb. per Sq. In.		Ultimate Strength, Lb. per Sq. In.	
	High Cu	Low Cu	High Cu	Low Cu
Cooled in furnace.....	52,900	45,800	86,530	78,130
Cooled in air.....	64,300	53,000	90,300	84,700
Bars as forged.....	60,900	46,600	92,600	83,200
Drawn at 580 deg. C.....	110,600	80,000	123,700	109,600
Drawn at 455 deg. C.....	136,900	100,000	151,500	129,300
Drawn at 360 deg. C.....	130,000	100,000	190,800	136,300
Quenched at 825 deg. C.....	?	110,000	(207,000)*	135,900
Per Cent Reduction				
Cooled in furnace.....	49.0	46.2	26.0	26.7
Cooled in air.....	52.7	52.7	27.3	27.3
Bars as forged.....	52.7	50.9	24.8	25.8
Drawn at 580 deg. C.....	56.3	54.6	32.2	32.7
Drawn at 455 deg. C.....	50.0	49.0	27.8	18.0
Drawn at 360 deg. C.....	39.1	40.2	9.2	12.8
Quenched at 825 deg. C.....	...	20.5	...	6.5

*Broke in threads because of annealing ends for threading.

[Detailed shock and hardness are given in the original paper.]

Microscopic Examination

The one fact revealed by the microscopic study was that for the same treatment the high-copper steel was finer grained than the low-copper. The quenched and drawn specimens of high-copper steel were also slightly more martensitic.

Discussions of Results and Conclusions

The results need little interpretation. The table of tensile strengths shows a striking superiority of the high-copper steel. The yield point and ultimate strength are in every case higher while the ductility is practically the same, although here too the average figures for reduction of area are with one exception slightly higher for the high-copper than for the low. This, however, is offset by slightly higher values for elongation in a majority of the tests in favor of the low-copper.

The hardness tests by both methods show the high-copper steel in all tests to be harder than the low-copper.

The Charpy shock tests show the high-copper steel in all cases to be superior to the low-copper.

In general, the results confirm the work of Ball, Stead, Breuil, and Campbell as regards the effect of copper on hardness and tensile strength. They confirm the work of Breuil as regards brittleness and the work of Campbell as regards reduction of area. It is also true, that as Stead has stated, the behavior of the copper steel resembled that of nickel steel.

American Iron and Steel Institute Raises Limit of Membership

The American Iron and Steel Institute has a limited membership. It has consisted of 1250 active members and 250 associate members. A waiting list of over 200 grew up. To meet this situation the board of directors has increased the active list to 1400 and the associate list to 400. This leaves a little margin for the present, but the demand for membership is so great that it is expected there will soon be another waiting list.

The Meurer Brothers Co., Inc., is the new corporate style of the former Meurer Brothers Co., 567 Flushing Avenue, Brooklyn, tin-plate, sheet-iron and metal manufacturers and dealers.

Germany and the Lorraine Iron Ore Fields

The recent statement of the French premier that France must continue the war until she has regained Alsace-Lorraine is receiving attention in Germany. The *Kölnische Zeitung* declares, according to British translations, that, although France may regard the possession of Alsace-Lorraine as necessary for her salvation, the loss of these provinces would be an economic catastrophe for Germany because of their richness in iron ore. This journal then gives figures indicating the value of the district to the German iron industry. The iron beds of German Lorraine cover about 108,000 acres and contain at a conservative estimate 1800 million tons of ore. In the last three years before the war the output of iron ore in the German customs union was as follows:

	1911		1912		1913	
	Tons	Per Cent	Tons	Per Cent	Tons	Per Cent
Germany, without Lorraine..	6,065,985	20.3	7,116,708	21.2	7,472,359	20.8
Lorraine..	17,754,571	59.4	20,033,236	59.5	21,135,554	58.8
Luxemburg..	6,050,797	0.3	6,533,930	1.9	7,333,372	20.4
Total..	29,879,352	100.0	33,733,874	100.0	35,941,285	100.0

For comparison the following table of the output of iron ore in France is given:

	1911		1912		1913	
	Tons	Per Cent	Tons	Per Cent	Tons	Per Cent
Briey	10,477,343	63.0	12,717,127	66.5	15,147,371	70.4
Nancy and Longwy..	4,577,139	27.5	4,517,989	23.5	4,666,201	21.7
Rest of France....	1,585,518	9.5	1,924,875	10.0	1,686,428	7.9
Total..	16,639,000	100.0	19,160,000	100.0	21,500,000	100.0

Thus, the minette district of Briey, Nancy and Longwy, the greater part of which is now in German occupation, accounts for about 90 per cent of the total iron-ore output of France. Its area is 6000 hectares (153,000 acres) and it has an estimated iron ore deposit of 3000 million tons. Hence the output of German Lorraine alone is equal to the entire French output. Besides this, Germany formerly imported considerable quantities of iron ore, notably from Sweden and Spain, for her pig-iron production. France, on the other hand, was unable to use up the whole of her ore output and exported about 38 per cent, mostly to Belgium, which has hardly any mines, and to Germany. This is shown by the following table in tons:

	Germany		France	
	1912	1913	1912	1913
Iron-ore consumption ..	43,544,336	47,347,172	12,290,478	13,171,200
Home output ..	33,733,874	35,944,285	19,169,000	21,500,000
Imports	9,810,462	11,455,887
Exports	+6,869,522	+8,328,800

"Without Lorraine and Luxemburg we shall lose four-fifths of that form of natural wealth which is most essential to a modern manufacturing and fighting nation," is the German argument. Before the war the German iron output was to the French as 36 to 21; with a "German peace" it would be as 51 to 6; with the peace for which the Allies are striving it will be as 8 to 42, the balance—the Luxemburg production—going to Belgium.

"This is an unbearable prospect, but what upsets the *Kölnische Zeitung* even more is that there are people in Germany who not only contemplate the cession of German Lorraine to France with equanimity but who dare to say so publicly," says the London *Ironmonger*. A Socialist member of the German Reichstag, Deputy Vettters, at a meeting at Würzburg declared that it would not particularly distress Germany to cede part of German Lorraine to France if only thereby peace could be obtained. "If we had to purchase peace by Herr Vetter's formula," says the *Kölnische Zeitung*, "then goodbye to the world power of Germany."

ESTABLISHED 1855

THE IRON AGE

EDITORS:

A. I. FINDLEY

WILLIAM W. MACON

GEORGE SMART

CHARLES S. BAUR, *Advertising Manager*

Published Every Thursday by the IRON AGE PUBLISHING CO., 239 West 39th Street, New York

W. H. Taylor, *Pres. and Treas.*

Charles G. Phillips, *Vice-Pres.*

Fritz J. Frank, *Secretary*

M. C. Robbins, *Gen. Mgr.*

Owned by the United Publishers Corporation, 243 West 39th Street, New York. H. M. Swetland, *Pres.* Chas. G. Phillips, *Vice-Pres.* W. H. Taylor, *Treas.* A. C. Pearson, *Secy.*

BRANCH OFFICES—Chicago: Otis Bldg. Pittsburgh: Park Bldg. Boston: Equitable Bldg. Philadelphia: Real Estate

Trust Bldg. Cleveland: Guardian Bldg. Cincinnati: Mercantile Library Bldg. San Francisco: 320 Market Street.

Subscription Price: United States and Mexico, \$5.00 per year; single copy, 20 cents; to Canada, \$7.50 per year; to other foreign countries, \$10.00 per year.

Entered as second class matter, June 18, 1879, at the Post Office at New York, New York, under the Act of March 3, 1879.

An Industrial Defeat

No part of the country's conduct of the war is more humiliating than the paralyzing effect on the steel industry of the collapse in the transportation of fuel. Steel is the basic war product. Lack of steel—such a lack as crippled the Entente Allies in the first year of the war—means a prolongation of the conflict and adds to the fearful cost in human life. Yet the United States, which in 1917 produced nearly three tons of steel for every two tons in the rest of the world, has fallen in recent weeks much below that rate, and has come far short of the rightful expectations of the Allied countries. In all the hardships industry has borne in this unparalleled winter, the people have had satisfaction from the assurance that everything has been done to maintain steel output. At least, it has been the common belief that steel works whose product goes into ordnance or munitions or ships have had the preference in the distribution of fuel.

Unfortunately, no such care has been taken to insure continuous operation of plants turning out the most essential forms of steel. As an example, the Coatesville, Pa., works of the Midvale Steel & Ordnance Co., which operates practically 100 per cent on material required for the Government ship-building program, suffered the following interruptions between Dec. 1 and Feb. 10, a period of 59 working days:

Blast furnace No. 1.....	shut down 42 days
Blast furnace No. 2.....	shut down 28 days
Blast furnace No. 3.....	shut down 36 days
Open-hearth department.....	shut down 28 days
Plate mill No. 1.....	shut down 10 days
Plate mill No. 2.....	shut down 4 days
Plate mill No. 3.....	shut down 25 days
Plate mill No. 4.....	shut down 25 days

The Midvale Steel & Ordnance Co. owns its own coal and its own cars. Its mines and works are served by the Pennsylvania Railroad, hitherto regarded as unexcelled in the world in equipment and operation. Eastern Pennsylvania was not exceptional in the break-down. The great steel-making centers of western Pennsylvania, Ohio and Illinois suffered in like degree.

The Government's control of the steel industry in respect to prices and deliveries for war purposes has been practically as complete as that exercised in

food and fuel. Yet it has permitted manufacturing operations that are not only non-essential but to a degree hurtful to industry, as in the case of breweries, to compete with iron and steel works for the available fuel and railroad cars. That there has been this tenderness to industries that cannot help in winning the war while iron and steel works have been compelled to go out of business in the face of constantly increasing demands upon them for the war, is one of the most serious counts in the indictment against the war management. A defeat at the front could not be more serious, and should not cause more dismay than this defeat of the efforts of the most essential of war industries to serve the American Government and its Allies.

The passing of winter, we are assured, will bring better conditions. True enough. But better weather will not cure that which was chiefly responsible for the break-down in the steel industry. The present reckoning at Washington should not be allowed to pass without providing some guarantees against a repetition of these deplorable conditions, which will go down as the one signal defeat of the first year of the war.

Record Iron and Steel Exports

Iron and steel exports in December, as reported in THE IRON AGE last week (page 390), made a new record for a month's movement, at 656,044 gross tons, against a previous record of 643,763 tons, made in September, 1916. The showing is a gratifying one for the eleventh month of the submarine campaign against merchant shipping. It should be noted also that the official statistics for December do not include the total outflow of material, seeing that shipments on Government transports or on vessels specially chartered by the Government are not counted in the export figures, since such vessels are not required to clear from ports of exit.

Iron and steel exports by calendar years have been as follows, beginning with the two best years before the war:

Iron and Steel Exports—Gross Tons

1912.....	2,947,596	1915.....	3,532,608
1913.....	2,745,635	1916.....	6,102,104
1914.....	1,549,554	1917.....	6,227,737

After all, the export movement in the past two

years has not been such a remarkable one. The gain over the best exports before the war is only a trifle more than 100 per cent, and the increase in tons represents no large part of our output. The totals given above cannot be compared directly with our production, for the reason that they are the total of a heterogeneous collection of materials, scrap, pig iron, unfinished steel, wire, horeshoes, etc. For many of the commodities the statistics of production are not even gathered. However, the scrap, pig iron and castings may be excluded and the remaining items be reduced to terms of finished rolled steel, either exported directly or required to make the more finished products that were exported. Thus considered, the steel exports represent about 5,200,000 tons of finished rolled steel, which, compared with an output of about 31,000,000 tons in 1917, represents 17 per cent of the output. If the pig iron exported were set against the pig iron that is produced and not used in steel making, a very small proportion would be shown, and with scrap the proportion would be insignificant, which, of course, is not to the point.

A much larger tonnage of steel than formerly is represented in machinery, railroad rolling stock and automobiles exported, and the heavy exports of loaded and unloaded shells also involve a great deal of steel. The grand total of all rolled steel that is either exported or used in the production of articles that are exported, is probably between 6,000,000 and 6,500,000 tons, or in the neighborhood of 20 per cent of the rolled steel output.

While countries of destination are given in connection with but a small portion of the export statistics, it is obvious that our iron and steel exports, both of steel-mill products and of manufactures, are to our Allies, of course including Canada and Japan. On the one hand, the major portion of the steel exported will hardly be salvaged after the war, except as scrap, while on the other hand the remainder of the world is being starved as to steel. Its disposition to advance remains, being merely checked, and in a measure the demand is accumulating, to be expressed after the war.

Mr. Powell's Stirring Appeal

The highly important testimony of Vice-president Joseph W. Powell of the Bethlehem Shipbuilding Corporation, given a few days ago before the Senate Committee on Commerce at Washington and reported fully elsewhere in this issue of THE IRON AGE, is worthy of the most careful perusal, not only for its comment on the building of fabricated steel ships, concerning which opinions may differ, but also on account of the stirring words of Mr. Powell concerning the labor situation, about which patriots cannot disagree.

Mr. Powell vigorously asserted that a campaign of education of workingmen that will reach everybody in this country is the most vital need of the present times. In spite of all that has been said about money and food and steel and other things winning the war, victory cannot be achieved without the right spirit in the heart of the American workman. But, given the right spirit, Mr. Powell firmly believes that there will be more ships built

than any one now dares to dream. He is not merely advancing a theory, but tells from his experience how much has been accomplished by ex-President Taft and others in going into shipyards and talking to the men.

That manufacturers have endeavored to do what they could to improve the spirit of their employees is no doubt true, and credit should also be given to Secretary of Labor Wilson for the addresses he has made and especially for his exposition of the fallacy of the pacifist's cry that this is a capitalists' war. Secretary Wilson is showing in his speeches that if the capitalists had followed a selfish course, they would have exercised their utmost influence to have this country remain neutral and seek a market among the warring nations. Overwhelming evidence of the truth of this statement is furnished by the financial reports of many companies which, after deducting excess profit taxes, have earnings far below what they would have had if the United States had remained a neutral. In the forcible but inelegant language of the labor leader, Secretary Wilson predicts that during the period of war against autocracy, labor will not "scab" upon the United States of America.

In spite, however, of all the good work that is being done to instill the right kind of spirit into workmen, evidence is constantly coming up, as in the case of the recent disclosures concerning the pamphlet of Scott Nearing, that highly unpatriotic and treasonable documents are being scattered broadcast, and doubtless it is true that where one word is circulated in print countless numbers come from word of mouth in efforts to make the war unpopular and bring about peace at any price. It behooves manufacturers and employees alike to act upon the advice of patriots like Mr. Powell, and do everything in their power for the vigorous prosecution of the war until a peace founded upon victory and justice can be obtained.

Economics of Government Loans

In addition to its various other activities the Government has found it necessary to issue some lessons in economics, not for the guidance of the "cost plus" contractors, nor yet for the illumination of manufacturers who wait months for the Government to pay their bills, but for the instruction of prospective purchasers of Liberty bonds. To a committee of eminent economists, headed by Prof. Irving Fisher of Yale, the Treasury Department entrusted the task of studying the purchasing power of money in war time. The first statement was made public last Thursday.

The committee points out that the way to lend money to the Government is to save the money first, not to borrow it. Perhaps it is only a coincidence that the statement was published the same day on which Secretary McAdoo telegraphed the banks of the country that he proposed to borrow half a billion dollars every fortnight from them by means of certificates of indebtedness, the next Liberty loan being meanwhile postponed "until conditions will insure a wide distribution of the bonds throughout the country." At any rate, the showing is clear on the surface that the Government proposes to make

the temporary borrowings while the people are expected to accumulate their savings.

The people at large will readily subscribe to the doctrine enunciated by the eminent economists, who explain that if one keeps on buying things as formerly and borrows money to loan to the Government, the Government must become a bidder for commodities in a market that is already sold out, and the natural result will be an enhancement of market prices, whereby the people will eventually find themselves worse off. The homely—or, at any rate, clear—illustration of the automobile is selected. If the man in the street orders a new automobile and then borrows money from his bank to loan to the Government, the Government endeavors to buy a motor truck, only to find that the factory already has an order. While the principle is perfectly clear, the practical application by the man in the street is not so readily made. The people of the United States do not spend enough money on things they can do without to equal the amount of money the Government must borrow. The wealth and productive power of the country are always exaggerated by the statistics. There are duplications, and there is the inclusion of items for which actual value is never realized.

Perhaps the people might reply to the eminent economists that there is nothing they so ardently desire as to cut down their living expenses, and as to the employment of the money when it has been saved, why, almost any good investment, including Government bonds, would readily be accepted.

The teaching is undoubtedly sound, but it is by the people, rather than by the Government, that the high cost of things has been felt first, and is being felt at the present time. The Government gets the commodities it wants by the simple process of stating that it requires them. The people have no such means.

It is to be hoped that the propaganda will be successful and that the people will be induced to save more than they have thus far. As a means of providing funds for the purchase of Liberty bonds the plan is excellent, but it will not go the whole length. As matters stand, it is not possible for the people to save enough money to cover even half the bonds that must be issued.

That the war cannot be financed by the people lending their credit to the Government is obvious, and that is what borrowing money to buy Liberty bonds amounts to. The one thing the Government stands least in need of is credit. Irrespective of who pays or who saves, the bald fact is that the material things the Government requires must be found in two ways: by consumption being reduced and by production being increased. A propaganda is good in its way, but it is common knowledge that the most direct method of approach is through the pocket. The system of taxation that has been adopted, and is to be expanded or modified at the present session of Congress, does not stand in harmonious relation with the dictum that consumption should be decreased and production increased. The logical procedure would be to tax consumption rather than production. While the statement of the Treasury Department's committee of economists is intended for the guidance of the people, directing them to produce more and consume less, it may well

be referred respectfully to the attention of the legislative branch of the Government for careful consideration in connection with its deliberations on the subject of taxation.

Copper in Steel

Much, perhaps too much, has been said about copper in steel so far as its anti-corrosive effect is concerned. But in comparison little has been brought out prominently regarding other benefits which copper confers on steel. The subject is to be brought up before the February meeting of the American Institute of Mining Engineers by Professor Hayward and an abstract of his paper is presented on other pages of this issue. The author proves that 0.75 to 1 per cent copper in steel not only advances the yield point and tensile strength as compared with practically non-copper medium carbon steel, but that it also renders the steel measurably more resistant to shock—an important consideration. Hardness is also increased by copper. Confirming other investigations, the author shows, as Stead has demonstrated, that the behavior of copper in steel resembles that of nickel.

Not so long ago copper was regarded as a detrimental impurity in steel and many operators, particularly steel casting makers, refused to buy pig iron containing copper. It is probable that wrong opinions have been accepted as to this metal and some troubles wrongly laid at its door. Its value has perhaps been overlooked in the greater importance and use of nickel, chromium or vanadium. It is certainly cheaper than any of these metals, and its use may become wider as our knowledge broadens. Further study is desirable. It may be said, as an incentive, that one large maker of converter steel castings in this country, from several years' experience, has become convinced that copper in his steel, up to 0.75 to 1 per cent, unavoidably present from the grade of pig iron he uses, raises the tensile strength and other physical properties of his product at least 10 per cent with no detrimental effects in other ways.

The difficulties of the railroads on the score of labor have been due in part, but only in part, to the exposure of many employees to the severities of the worst winter on record. There has been much evidence of a steady decline in morale which has extended from high places all the way down through the rank and file. Railroad employees of the higher grade have been affected alike with the men in the yards. As an illustration: Some years ago a superintendent of a well-known coke company was asked by a number of young miners at one of the properties in his charge to help them in getting employment with a railroad which has been a synonym for the highest standards in organization, operation and the treatment of its men. By their employer's help their ambitions were realized. From lower positions they worked their way up until they became locomotive engineers. Their former superintendent, now president of his company, was called upon not many

days ago by several members of the group and could scarcely believe he heard aright when they asked to be given their old places in the mines. Several reasons were given, one of these being that as miners they would not be separated from their families the greater part of the time. But the significant thing was that, having had experience in both employments, they preferred to return to the coal mine. Whether the prospect of Government railroad control figured at all in the decision does not appear. What stands out in the incident is that railroad work under more recent conditions is not what it has been rated heretofore, and there are other indications corroborative of the choice of these Pennsylvania miners.

Steel Ingot Production Falls Off Sharply in January

The American Iron and Steel Institute has published in the past week statistics of steel ingot production in January, as reported by twenty-nine companies which made 88.14 per cent of the ingot production in 1916. The figures are given below, and comparison is made with returns from the same companies by months, beginning with June, 1917, all in gross tons:

	Open-Hearth	Bessemer	All Other	Total
June, 1917.....	2,265,772	809,552	8,605	3,083,929
July	2,152,479	777,171	9,465	2,939,115
August	2,251,013	863,873	8,331	3,123,217
September	2,195,556	770,064	6,639	2,972,259
October	2,475,754	870,494	5,687	3,351,935
November	2,384,218	772,489	9,550	3,166,257
December	2,195,832	524,084	13,806	2,733,722
January, 1918.....	1,763,356	429,588	10,901	2,203,845

It will be seen that the January output was 530,000 tons, or almost 20 per cent, less than that of December and more than 33 per cent less than that of October, which was the record month in 1917. The Bessemer ingot output in December, 429,000 tons, was less than half that of October. Assuming that the unreported production in January was the same proportion of the total as in 1916, the January ingot production of the country was 2,500,386. That would be at the rate of 29,440,000 tons a year, whereas the ingot production in 1917 was close to 42,200,000 tons.

Slight Increase in Steel Corporation's Orders

Unfilled orders on the books of the United States Steel Corporation on Jan. 31 were 9,477,853 tons, an increase of 96,135 tons over those reported for Dec. 31. This compares with an increase of over 480,000 in December, and is the second increase in the last eight months. The unfilled orders have fallen under 9,000,000 tons only three times in the last two years—in November, 1917, and in January and February, 1916. The following table gives the unfilled tonnage at the close of each month since January, 1915:

	1915	1916	1917	1918
January	4,248,571	7,922,767	11,474,054	9,477,853
February	4,345,371	8,568,966	11,576,697	
March	4,255,749	9,331,001	11,711,644	
April	4,162,244	9,829,551	12,183,083	
May	4,264,598	9,937,798	11,886,591	
June	4,678,196	9,640,458	11,383,287	
July	4,928,540	9,593,592	10,844,164	
August	4,908,445	9,660,357	10,407,049	
September	5,317,618	9,522,584	9,833,477	
October	6,165,452	10,015,260	9,009,675	
November	7,189,489	11,058,542	8,897,106	
December	7,806,220	11,547,286	9,381,718	

The Texas Steel Co. has begun the work of rehabilitating the iron furnace at Rusk, which it recently purchased from the State of Texas. It expects to have the plant ready for beginning operation about April 1.

CONTENTS

Advanced Ideas in Gray-Iron Foundry.....	435
Speeding Up Work at Hog Island.....	438
A Combination Swivel and Chain Repair Link.....	439
Railroad Track Defects.....	440
A Safe Factory and Workshop Step-Ladder.....	440
Electric Drying Ovens in a Rod Mill.....	441
Book Review	442
Work for Which 250,000 Mechanics Are Needed.....	443
Corrosion of Iron and Steel.....	444
Improving Side-Blow Converter Practice.....	444
Electric Air Heating Units.....	445
Birdsboro Foundry Increases Capacity.....	445
A Traveling Argument Against Waste.....	445
German Basic Bessemer Plants.....	445
Electric and Converter Castings Compared.....	446
A Small Worm-Driven Electric Hoist.....	447
Evolution of Cable Making.....	448
Pyrometers and Pyrometry.....	448
Goldschmidt Companies Consolidated.....	448
Salvaging War's Work.....	449
Professional Unity	449
Chemistry in the War.....	449
Mobilizing Labor for War Purposes.....	450
Illness in Industry.....	451
Effect of Copper in Medium-Carbon Steel.....	452
American Iron and Steel Institute Raises Limit of Membership	453
Germany and the Lorraine Iron Ore Fields.....	453
Editorial:	
An Industrial Defeat.....	454
Record Iron and Steel Exports.....	454
Mr. Powell's Stirring Appeal.....	455
Economics of Government Loans.....	455
Copper in Steel.....	456
Steel Ingot Production Falls Off Sharply in January.....	457
Slight Increase in Steel Corporation's Orders.....	457
Electric Steel in England.....	458
Active Canadian Demand.....	458
Centered Control of Industrial Financing.....	459
Iron and Steel Markets.....	460
Iron and Industrial Stocks.....	470
Will Broaden Its Work.....	472
Mediation Commission's Remedies for Labor Troubles....	472
Steel Scarcity Affects Car Service.....	472
Prices Finished Iron and Steel, f.o.b. Pittsburgh.....	473
Metal Markets	474
Cleveland War Industries Are Organized.....	474
High Cost of Shutdowns.....	475
First Keel Laid at Hog Island.....	475
New By-Product Ovens Soon in Operation.....	475
Personal	476
Obituary	477
A Large Steel Foundry at Hongkong, China.....	477
British Ferromanganese and Tin Plate for Spain.....	477
Broaden Control of Material for Export.....	477
British Steel Output Now 12,000,000 Tons Yearly.....	477
Failure of Steel Ship Plans Predicted.....	478
Correspondence	481
Georgia Steel Co. Suit Decided.....	481
Machinery Markets and News of the Works.....	482

ELECTRIC STEEL IN ENGLAND

Reasons for the Prohibition of Furnace Installations—Acid or Basic Steel for Castings

REFERENCE was made in THE IRON AGE, Sept. 27, 1917, to the British prohibition to proceed with the further installation of electric furnaces except under license from the Ministry of Munitions. Actual conditions, as they appear to those closely connected with the industry, are detailed as follows by the London *Iron-monger*:

The statement that there has been over-production of electric steel is only true for certain classes of material, comprising the output of a small minority of furnaces, but makers are finding a ready market at high prices for the great bulk of the electric steel they can turn out. A partial explanation of the few instances of surplus production is that owing to the employment of inexperienced persons to take charge of the furnaces, the quality of the steel produced has not always been satisfactory, but the general reputation of electric steel for high quality should not be allowed to suffer because some makers have failed to utilize to the best advantage the skill and experience really available. Electric steel suffered a similar temporary setback some five or six years ago, when the country was flooded with a cheap steel made in the open-hearth furnace which had received a perfunctory finishing treatment in the electric furnace and was sold as electric steel.

Large Demand for Electric Steel

There is at present an overwhelming demand for electric steel for many important purposes, and this is certain to go on increasing as new applications develop. Unfortunately, men with little experience or even theoretical knowledge have been put in charge of furnaces simply because they had worked around a furnace for a few weeks, and many of them seem to think that it would imply unpardonable ignorance on their part to seek advice in dealing with difficulties. The really experienced managers of electric foundries as a body, however, are eager to exchange knowledge, observations and experience.

Electric steel-furnace practice is comparatively new, and owing to the conservative attitude of the steel trade toward electric melting in the past, there has been no opportunity to train a large number of metallurgists or melters experienced in the art of using these furnaces. No manager, therefore, need feel any diffidence in asking questions which imply that he does not know all that is to be learned about the running of an electric furnace.

Inconsistencies in Dealing with Licenses

The erection of electric furnaces under special license is not such a recent innovation as some reports seem to imply, as the Ministry of Munitions has exercised its right to grant licenses for about 12 months. Applications for these licenses appear to have been dealt with in such an unaccountable fashion that it has become highly desirable that the authority responsible for them should state definitely what are the considerations which govern the granting or refusal of a permit. So far the decisions have been alike inconsistent, illogical and inexplicable. One learns with amazement of the Ministry sanctioning the erection of a furnace in such an unlikely center as Aberdeen (where the Municipal Council appears to have extended a special welcome to the introduction of this new industry into the district), while the applications of experienced steel-makers in Sheffield and Birmingham, two great centers of the steel industry, are constantly rejected. Another example: Two Sheffield manufacturers of the same standing applied for licenses. Both make the same class of steel, are equally experienced in the trade and have the same urgent necessity for putting in an electric furnace. One was granted a permit; the other has been continuously refused one without any satisfactory explanation being offered. There appears to be some

ground also for thinking that the department dealing with these matters makes some distinction between different types of furnace.

There is a strong tendency in some quarters to persuade manufacturers who install electric furnaces for steel castings to put in acid-lined furnaces, and this advice would appear to receive some official backing. Such a practice is contrary to the best experience of the trade and to the opinion of experts. Castings can certainly be made much cheaper in acid-lined furnaces than in basic furnaces, but steel cannot be refined for low sulphur and phosphorus contents except in the basic furnace, so that basic steel castings are infinitely superior in quality to acid steel, and will undoubtedly command the market when ordinary trade is resumed. Makers putting in acid-lined furnaces now should, therefore, make provision to convert them to meet after-the-war conditions.

Reasons for the Prohibition Answered

Half a dozen reasons have been put forward in various journals and otherwise circulated justifying the prohibition of construction of new electric furnaces. These reasons, and the replies to them, may be summarized as follows:

Alleged shortage of electrodes. This existed six or eight months ago, and the Ministry of Munitions could not then be persuaded to take over the control of the supply. Private effort having succeeded in improving the supply so that it is more than sufficient to meet the requirements, the Government has stepped in and taken control.

Shortage of labor. This is a good card to play until it is pointed out that the installation of an electric furnace releases about 80 per cent of the men employed round a crucible furnace without diminishing the output.

Shortage of electrical energy. Curiously enough, this does not exist in those districts where the introduction of electric furnaces is most ardently desired by the manufacturers.

Diversion of skilled labor and material from other important munition work to the construction of electric furnaces. This reason is hardly tenable in view of the tremendous productivity of the electric furnace, which amply covers in its first week's working the small amount of material and labor utilized in its construction.

Lack of experienced men to handle electric furnaces. This argument would carry more weight if large electric furnaces were not allowed to be set up in places like Aberdeen and Lincoln, while their installation in centers like Birmingham and Sheffield is vetoed.

In the future interest of the British steel industry the installation of electric furnaces should be encouraged in those localities where the need for electric steel is urgent, and which possess the best experience in steelmaking; and by proper co-ordination of the experience and knowledge already distributed among the few expert men, promising engineers could be quickly trained in the handling of new installations. And the government, instead of merely pointing out difficulties in the way of this important industrial development, might well make some attempt to try to surmount these.

Active Canadian Demand

Canadian manufacturers are actively and urgently in the market for steel making and foundry grades of pig iron, as well as for steel products. The Dominion Bridge Co., Montreal, has secured a contract for 8000 tons of fabricated shapes for another section of the T. Eaton Co.'s department store at Toronto, this is in addition to the contract for 22,000 tons placed some months ago and subsequently held in abeyance. The Dominion Steel Co., and McGregor & McIntyre have jointly received an order for 1800 tons of steel for the new ship plant being erected at Toronto for the Toronto Shipbuilding Co.

The date of the spring meeting of the National Association of Brass Manufacturers has been changed one week, and the meeting will be held at the French Lick Springs Hotel, French Lick, Ind., Wednesday and Thursday, March 27 and 28.

Centered Control of Industrial Financing

Congress Likely to Pass the McAdoo Bill Creating a Dicta- torship of Corporation Securities

WASHINGTON, Feb. 12.—Secretary McAdoo's bill providing for Government financing of all industries during the war and establishing a license system that will make it impossible for any individual, firm, or corporation engaged in any manufacturing business to issue securities in excess of \$100,000 except with the specific approval of the Government has been taken up for consideration by the Ways and Means and Finance committees before which Mr. McAdoo has already made some exceedingly interesting disclosures. Drastic as the measure appeared when its provisions were first given to the public a week ago, the explanation of its comprehensive objects as given to the Finance Committee by the Secretary of the Treasury makes it clear that its enactment will create an industrial dictatorship more arbitrary and all-powerful than has been organized in any country involved in the war. It is a curious fact, however, that the prospect for the enactment of this extraordinary measure has been substantially improved by the publication of the text of an even more amazing bill just introduced in the Senate at the President's request by Senator Overman, clothing the Executive with power tantamount to authority to reorganize all the executive departments and virtually suspend all statutes dealing with the processes for conducting the business of the Government.

McAdoo Bill Likely to Pass

With this unprecedented measure before it, Congress, which, in spite of the astonishing demands now being made upon it, is seeking to support the Administration with the utmost loyalty, will probably accept the McAdoo bill and, possibly with certain amendments, place it on the statute books at a comparatively early date.

When the bill framed by the Secretary of the Treasury was first made public it was accompanied by a formal statement emphasizing the fact that it was intended to provide the necessary financing facilities for corporations whose operations contributed to the conduct of the war. It now appears that administrative officials are looking to the measure for authority not only to stimulate war industries but to suppress those industries the products of which may be decided to be in the nature of luxuries or non-essentials.

"The provisions of the Federal Reserve law, which permit member banks to rediscount paper," says Mr. McAdoo in a statement laid before the Finance Committee, "have had the effect of driving the banks to discriminate against loans on ineligible paper, even where such loans were vitally necessary for war purposes, and in favor of commercial paper, even though of companies whose activities were not related to the war and which might well be curtailed during the period of the war. It is believed that the proposed bill has been wisely and conservatively conceived as a war measure to give relief from this condition during the period of the war."

Limiting the Use of Capital

As a corollary to the provision for the extension of credits, the Secretary points out, the bill provides for the approval or disapproval, by the federal corporation created by the measure, through a system of licenses, of issues of securities with a view of preventing the use of capital in unnecessary expenditures during the war. The Secretary of the Treasury has already asked for the voluntary submission to the Federal Reserve Board of any projected capital issue and has asked the opportunity to pass upon such issue. In commenting upon the service of the board in this connection, the Secretary makes this significant statement:

The work which the board has taken on this line should be regarded as preliminary to and laying the basis and furnishing in no small part the organization for the work which the proposed corporation will have to do. It is believed that the proposed license system is wise and fair, since the voluntary system now set in motion will tend to restrict the activities of those patriotic people who have the public interest most at heart and to discriminate against them in favor of those unpatriotic people who ignore the war necessities by refusing to co-operate. The proposed license system is in line with the act which established the selective draft in lieu of a voluntary system of creating an army to win the war. The sacrifices which must be made if the war is to be won should be made by all alike and not merely by those whose patriotism impels them to volunteer and who would have to carry the entire burden unless the slackers are compelled to do their part.

A Check on Non-Essentials

The Secretary's statement makes it obvious that the so-called non-essential industries of the country are to be regarded as "slackers" and are to be denied all opportunities for expansion, regardless of the extent to which they may employ labor that cannot be utilized for war purposes or of the amount of their contributions to the nation's war fund in the form of taxes. It is an interesting fact, in this connection, that the Fuel Administrator, notwithstanding the extraordinary projects he has adopted to conserve fuel, has been unwilling to discriminate against so-called non-essential industries and, in fact, has publicly announced that in his opinion such discrimination would work serious injury to the nation as a whole. It is also suggestive that in imposing the existing freight embargo no attempt at discrimination has been made beyond a general exemption for food and certain urgently needed war material. It would seem probable, therefore, that the authorities are relying upon the control of financing operations which the McAdoo bill would give them to accomplish what it has not been deemed advisable to attempt through more direct measures.

W. L. C.

Locomotives for Chile

TORONTO, ONT., Feb. 11.—An interesting development in connection with the war time export manufacturing trade of Canada is the placing of an order in the Dominion for 20 locomotives for the Chilean State Railway. This order has been placed with the Montreal Locomotive Works, a subsidiary of the American Locomotive Co., having been arranged through the foreign order bureau of the parent company in New York. This is not the first of such orders, as the company recently booked an additional order for 20 locomotives for the state owned railway of the South African Commonwealth. This makes a total of 58 locomotives for that country in addition to which 18 are being constructed for the Rhodesia Railway. All told, the company now has on its books orders for 96 locomotives, which in ordinary times could be turned out in less than three months. Building locomotives in Canada for railways abroad is very largely a development of war time, as most of these orders were formerly placed in England or Scotland. Those industrial centres now have their hands full with war work and cannot attend to foreign orders; so they are passed over to other countries which are not so seriously hampered.

The Empire Steel Co., Raleigh, N. C., recently organized, is considering a site near Winston-Salem for the erection of a plant for the manufacture of seamless steel tubes, bar steel, and kindred specialties.

Iron and Steel Markets

SOME GAIN IN OUTPUT

Milder Weather Helps in Slow Recovery

New Restrictions on Steel Exports—Small Steel Ingot Production in January

Milder weather and a somewhat freer movement of traffic have given a more cheerful tone to iron and steel market reports, but the derangement of the whole machinery of production and shipment was so complete that many days will be required, even with no return of severe winter, for any approach to normal. It is to be remembered that excepting October and November, each month since April of last year has shown a decline in iron and steel output, so that the causes go deeper than the weather.

Steel works operations in the Central West are generally at 60 to 70 per cent of capacity and some steel plants, owing to freight embargoes and the large accumulation of unshipped product, are to-day doing little better than 50 per cent.

The industry continues to look to Washington for its impulse toward better or worse conditions. Its latest concern is the sharper restriction put upon exports, the War Industries Board having warned producers not to begin rolling such steel until export licenses covering it have been issued by the War Trade Board. Blast furnace, steel works and rolling mill products, the trade is now advised, are on the conservation list and all shipments are subject to the new restriction unless bills of lading had actually issued previous to Feb. 11.

This tightening of export regulations, following recent efforts to make Government prices apply to certain iron and steel exports even though not intended for war purposes, is disconcerting to interests that have thrived on foreign trade.

Steel manufacturers are still much at sea as to the amount of steel they can supply apart from war uses and the new business going on their books is small. It is plain that even in plates a considerable amount will be available for ordinary commercial purposes whenever capacity output can be reached. Both plate mills and fabricating shops have had their operations badly upset by the unreadiness of certain shipyards to take material as scheduled.

It will be some time before a new distribution is made of shell steel, deliveries on the 1,500,000 tons now under contract running to June 15. Meanwhile the British Mission is inquiring for 120,000 tons of plates, but modification of some of the unusual widths and lengths, 46-ft. lengths in many cases, will need to be made, in the same way that

was necessary with our own Government's first orders, to insure early rolling.

The Government has divided among eight car builders the 4500 cars long under consideration for France; but the new car program for domestic roads drags unaccountably.

The new ruling of the railroads that special permits for the movement of freight will be granted only on the application of the consignee, indicating need of the material and ability to unload promptly, is expected to help in reducing congestion.

January output of steel ingots, estimated on returns from companies producing 88 per cent of the country's steel ingots in 1916, was 2,500,400 tons, against 3,106,500 tons, the estimate for December, and 3,809,000 tons for October, the month of largest production in 1917. The February rate thus far has been well below that of January.

The inquiry for pig iron for the second half of the year is larger in a number of markets, particularly in New York, Cincinnati and Chicago. At Cincinnati more Southern iron was sold than in any week for two months, some of the contracts providing that if the Government price after April 1 is unsatisfactory sellers may cancel.

The marked reduction in pig iron output in the past six weeks points to a shortage in the later months of the year, and this may be more than is now counted on in standard irons, since irregular operation of furnaces and poor coke have much increased the percentage of off grades.

The pig iron curtailment naturally will leave blast furnaces with more ore at the opening of navigation than was expected. Already some furnace companies have notified iron ore sellers at Cleveland that they will not need the full amount of their original reservations for 1918.

Pittsburgh

PITTSBURGH, Feb. 12—(By Wire).

The mild weather of the past week has already opened up the railroad congestion to some extent that had paralyzed the steel business for a month or more, and if this weather should last for two weeks, it is firmly believed that most of the railroad congestion would be largely a thing of the past and shipping and receiving conditions would be close to normal. However, it is well to remember that much of the railroad troubles is being caused by lack of motive power, and a return to normal railroad conditions can hardly come until much of the motive power now in use has been overhauled and put in first-class condition. This would take considerable time, but the work connected with moving trains is not nearly so trying in mild weather as it is in times of intense cold, of which we have had so much in the past two months. A new ruling put into effect recently by the railroads is that special permits for the movement of freight will be granted only upon

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Feb. 13, 1918.	Feb. 6, 1918.	Jan. 16, 1918.	Feb. 14, 1917.
No. 2 X, Philadelphia...	\$34.25	\$34.25	\$34.25	\$31.50
No. 2, Valley furnace...	33.00	33.00	33.00	33.00
No. 2, Southern, Cin'tl...	33.90	33.90	33.90	26.90
No. 2, Birmingham, Ala...	33.00	33.00	33.00	24.00
No. 2, furnace, Chicago*	33.00	33.00	33.00	32.00
Basic, del'd, eastern Pa...	33.75	33.75	33.75	30.50
Basic, Valley furnace...	33.00	33.00	33.00	30.00
Bessemer, Pittsburgh...	37.25	37.25	37.25	35.95
Malleable Bess., Ch'go*	33.50	33.50	33.50	32.00
Gray forge, Pittsburgh...	32.75	32.75	32.75	31.95
L. S. charcoal, Chicago...	37.50	37.50	37.50	33.75

Rails, Billets, etc. Per Gross Ton:	Feb. 13, 1918.	Feb. 6, 1918.	Jan. 16, 1918.	Feb. 14, 1917.
Bess. rails, heavy, at mill	\$55.00	\$55.00	\$55.00	\$38.00
O.-h. rails, heavy, at mill	57.00	57.00	57.00	40.00
Bess. billets, Pittsburgh...	47.50	47.50	47.50	65.00
O.-h. billets, Pittsburgh...	47.50	47.50	47.50	65.00
O.-h. sheet bars, P'gh...	51.00	51.00	51.00	65.00
Forging billets, base, P'gh	60.00	60.00	60.00	85.00
O.-h. billets, Phila...	50.50	50.50	50.50	60.00
Wire rods, Pittsburgh...	57.00	57.00	57.00	75.00

Finished Iron and Steel, Per Lb. to Large Buyers	Cents	Cents	Cents	Cents
Iron bars, Philadelphia...	3.685	3.685	3.685	3.159
Iron bars, Pittsburgh...	3.50	3.50	3.50	3.25
Iron bars, Chicago...	3.50	3.50	3.50	3.00
Steel bars, Pittsburgh...	2.90	2.90	2.90	3.25
Steel bars, New York...	3.095	3.095	3.095	3.419
Tank plates, Pittsburgh...	3.25	3.25	3.25	4.75
Tank plates, New York...	3.445	3.445	3.445	4.919
Beams, etc., Pittsburgh...	3.00	3.00	3.00	3.25
Beams, etc., New York...	3.195	3.195	3.195	3.419
Skelp, grooved steel, P'gh	2.90	2.90	2.90	3.25
Skelp, sheared steel, P'gh	3.25	3.25	3.25	3.50
Steel hoops, Pittsburgh...	3.50	3.50	3.50	3.50

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire, Per Lb. to Large Buyers:	Feb. 13, 1918.	Feb. 6, 1918.	Jan. 16, 1918.	Feb. 14, 1917.
Sheets, black, No. 28, P'gh	5.00	5.00	5.00	4.75
Sheets, galv., No. 28, P'gh	6.25	6.25	6.25	6.50
Wire nails, Pittsburgh...	3.50	3.50	3.50	3.00
Cut nails, Pittsburgh...	4.00	4.00	4.00	3.70
Fence wire, base, P'gh...	3.25	3.25	3.25	2.95
Barb wire, galv., P'gh...	4.35	4.35	4.35	3.85

Old Material: Per Gross Ton:	Feb. 13, 1918.	Feb. 6, 1918.	Jan. 16, 1918.	Feb. 14, 1917.
Carwheels, Chicago...	\$30.00	\$30.00	\$30.00	\$18.00
Carwheels, Philadelphia...	30.00	30.00	30.00	20.50
Heavy steel scrap, P'gh...	30.00	30.00	30.00	22.00
Heavy steel scrap, Phila...	30.00	30.00	30.00	20.00
Heavy steel scrap, Ch'go	30.00	30.00	30.00	21.75
No. 1 cast, Pittsburgh...	30.00	30.00	30.00	19.00
No. 1 cast, Philadelphia...	30.00	30.00	30.00	20.00
No. 1 cast, Ch'go (net ton)	26.00	26.00	26.00	15.00
No. 1 RR. wrot, Phila...	35.00	35.00	35.00	25.00
No. 1 RR. wrot, Ch'go (net)	31.25	31.25	31.25	24.00

Coke, Connellsville, Per Net Ton at Oven:	Feb. 13, 1918.	Feb. 6, 1918.	Jan. 16, 1918.	Feb. 14, 1917.
Furnace coke, prompt...	\$6.00	\$6.00	\$6.00	\$10.00
Furnace coke, future...	6.00	6.00	6.00	7.00
Foundry coke, prompt...	7.00	7.00	7.00	11.00
Foundry coke, future...	7.00	7.00	7.00	8.00

Metals, Per Lb. to Large Buyers	Cents	Cents	Cents	Cents
Lake copper, New York...	23.50	23.50	23.50	34.50
Electrolytic copper, N. Y.	23.50	23.50	23.50	34.50
Spelter, St. Louis...	7.75	7.75	7.75	10.50
Spelter, New York...	8.00	8.00	8.00	10.75
Lead, St. Louis...	6.85	6.85	6.85	8.90
Lead, New York...	7.00	7.00	7.00	9.00
Tin, New York...	85.00	85.00	85.00	53.00
Antimony (Asiatic), N. Y.	13.75	14.00	14.00	30.00
Tin plate, 100-lb. box, P'gh.	\$7.75	\$7.75	\$7.75	\$7.75

application of the consignee. He must show that the shipment is necessary to meet his existing need and also that he is able to accept the shipment promptly upon its arrival, and unload the cars without delay, thus allowing the railroads to make further early use of them. Heretofore, the railroads required that the shipper had to apply for the permits, with the result that much freight was moved which the consignee could not handle promptly upon receipt, and this added to the railroad congestion which was steadily getting worse. Under this new ruling, which will likely remain in force as long as the war lasts, a new embargo bureau has been opened in Philadelphia under direction of W. C. Glynn, assistant general freight agent, to whom requests for shipments from a point on one division of a railroad to another, or to points on other railroads, must be made. This new arrangement does not apply to export traffic via New York, Philadelphia or Baltimore. Demurrage average agreements in effect prior to Jan. 21 are to be regarded as having continued in effect without interruption, according to a statement issued in Pittsburgh by James F. Fannestock, treasurer of the Pennsylvania Lines. It is believed this important action of the railroads is going to be a great help in removing the general railroad congestion. Operating conditions among blast furnaces, steel plants and other manufacturing works have as yet shown only slight betterment. On Tuesday, the Carnegie Steel Co. had 34 out of 59 blast furnaces in operation, 25 being banked and idle. Its steel works operations were on about a 70 per cent basis. Other large blast furnace and steel interests are operating on a 50 to 60 per cent basis, but with chances of an early heavier operation better than for a long time. Some companies report their receipt and movement of cars in the past week to have been better than at any time in nearly two months. The amount of new business being placed, aside from the heavy Government buying, in the steel business is still very small. In fact, producers are more keen to

get their heavy stocks piled in warehouses moved out and on their way to customers, than they are in trying to take on new obligations. Output of the mills under the present limited rate of operations is sold up for several months at least, and most consumers are not anxious to sell for delivery beyond March 31, owing to a possible revision in prices at that time, while consumers are not eager to place orders for the same reason.

Pig Iron.—The local pig iron market is almost dormant as far as new sales of pig iron are concerned. Some manufacturing plants that are engaged in filling heavy orders for materials for the Government that will run all through this year are naturally anxious to be assured of a supply of pig iron over the year, and this has resulted in some of these concerns buying their needs of foundry, Bessemer and malleable Bessemer iron for last half of the year, prices on which are to be those in effect at the time shipments of this pig iron are made. One leading pig iron producer has sold 25,000 to 30,000 tons of foundry, malleable Bessemer and standard Bessemer iron on the basis as given above, while another producer has sold large quantities of Bessemer and basic iron for last half of the year under the same conditions. The output of pig iron in Pittsburgh and nearby districts is not over 50 to 60 per cent of capacity. None of the furnaces is being driven as hard as usual, and the bad quality of coke being received is naturally affecting the quality of the iron. It is believed there will be more selling of pig iron for the last half of the year by furnaces to consumers who want to be assured of a supply of iron when they need it for their important Government contracts.

We quote as follows: Basic pig iron, \$33; Bessemer, \$36.30; gray forge, \$32; No. 2 foundry, \$33; No. 3 foundry, \$32.50, and malleable Bessemer, \$33.50, all per gross ton at Valley furnace, the freight rate for delivery in the Cleveland and Pittsburgh districts being 95c. per ton.

Billets and Sheet Bars.—There is not much new inquiry for billets or sheet bars, largely for the reason

that intending buyers know they cannot get steel, and have retired from the market. None of the steel mills has any billets or bars to sell on the outside, but all are entirely concerned with trying to take care of their regular customers, which they are not able to do in a satisfactory way, as their output of steel is probably not over 50 to 60 per cent of normal, and is being divided among customers as fairly as they can, and to the best possible advantage. Some steel mills that before the war were heavy sellers of billets and sheet bars to sheet and tin mills and other consumers have shut off supplying steel entirely to some of these former customers, while to others they are giving very limited amounts, mostly Bessemer steel. If the present mild weather lasts for two weeks or more steel mills will no doubt be able to operate at a heavier rate, as their supply of pig iron should show an increase.

We quote 4 x 4 in. soft Bessemer and open-hearth billets at \$47.50, sheet bars \$51, forging ingots \$73, and forging billets \$60 base, all f.o.b. at mill, Pittsburgh or Youngstown.

Steel Rails.—Some few sales of light rails are being made, mostly by the re-rolling mills, the mills rolling new light and standard section rails being sold up for some months. The Government price on light rails, rolled from billets, is \$3 per 100 lb. for 25 lb. to 45 lb. sections.

Ferroalloys.—Some inquiries for ferromanganese in lots of 100 up to 500 tons and for delivery in last half of this year have lately come out from consumers who are largely engaged in Government work, and who want to be assured of a supply of ferromanganese, so that there will be no interruption of operations. Some such sales have been made and negotiations are under way on others. There is also some inquiry for 50 per cent ferrosilicon for delivery in the same period, and it is said some sales have been made. We quote 80 per cent domestic ferromanganese for delivery all of this year at \$250 per gross ton delivered, 50 per cent ferrosilicon at \$165 to \$170 delivered and 18 to 22 per cent spiegeleisen at \$60 per gross ton at furnace.

We now quote 9 per cent Bessemer ferrosilicon at \$54, 10 per cent \$55, 11 per cent \$58.30, 12 per cent \$61.60. We quote 6 per cent silvery iron \$40, 7 per cent \$42, 8 per cent \$44.50, 9 per cent \$47, 10 per cent \$50. Three dollars per gross ton advance for each 1 per cent silicon for 11 per cent and over. All the above prices are f.o.b. maker's furnace, Jackson or New Straitsville, Ohio, these furnaces having a uniform freight rate of \$2 per gross ton, for delivery in the Pittsburgh district.

Structural Material.—The Government has lately placed some heavy contracts for structural steel work, and has more under negotiation, but fabricators, acting under explicit instructions from Washington, are not allowed to give out any details of this Government work. Local fabricators say the new inquiry for private building enterprises is extremely dull, and one fabricator says he does not know of a single large job of that kind in the market at the present time. Local fabricators are well filled up with work over the next four to six months, but it is largely for the Government, and they report that deliveries of plain material by the mills are very slow and due mostly to shortage in cars, and also to decreased output of plain material, which has been not over 50 to 60 per cent of normal for several months. Railroads are buying practically nothing and give no indication of coming in the market in the near future. We quote beams and channels up to 15 in. at 3c. at mill.

Plates.—Railroads are not placing orders for steel cars, and the builders are cleaning up old contracts, but most of the new work they are turning out is for the Government. The supply of plates of usual sizes from the smaller mills is not as large as some time ago, likely due to the very much reduced operation of these mills that were offering plates for fairly prompt delivery quite freely before the railroad congestion became so bad. No foreign shipments are being made, except possibly to the Orient, which go by way of the Pacific Coast. We quote ¼-in. and heavier sheared plates at 3.25c. at mill, Pittsburgh.

Sheets.—The shortage in supply of steel and cars and also the fact that concerns having both sheet and tin plate mills are speeding up output of tin plate all they can have resulted in cutting down output of sheets to an average of possibly 40 per cent of normal. Quite

a few concerns either have their sheet mills down entirely, running on tin plate alone, or are operating only enough sheet mills to meet the most urgent demands. Most sheet mills with the present light rate of operation are well sold up into second quarter, but new buying is light, the mills not being anxious to sell over second quarter, and consumers holding off placing orders, as they are not getting deliveries on contracts placed a good while ago. Enormous stocks are piled up in warehouses of the mills, and this is also an important factor in keeping the output down to a minimum. Prices on sheets are given in detail on page 473.

Tin Plate.—Owing to the very close co-operation that has existed between the tin plate mills and the Government since long before this country declared war, it seems absolutely assured that the output of tin plate this year for food containers, not only for our own country but also for our Allies, will be amply large to meet by far the heaviest demand that the tin plate mills have ever had. Shipments of tin plate have been light for some months due to the railroad congestion, and hundreds of thousands of boxes are piled up in warehouses, some of which have about reached their limit in storage facilities, and unless the supply of cars soon improves a heavy decrease in output of tin plate will be the result. However, the mild weather of the past week has made inroads on the railroad congestion, and if this should last for several weeks more the railroads would no doubt be able to furnish more cars and move them than has been the case for about two months. Shipments of tin plate to the Pacific coast have been heavy for some time, but the embargo on Eastern shipments is still in force. In spite of all the discouraging conditions that have surrounded the tin plate mills for several months, they have been able to maintain an average rate of operation of probably 90 per cent, and this certainly is a remarkable record. We quote tin plate in large and small lots at \$7.75 per base box at mill, rolled from Bessemer or open-hearth stock. The price of \$7.55 given in our report last week was a typographical error. Prices on tin plate are given on page 473.

Iron and Steel Bars.—With the very much reduced output of iron and steel bars for the past month or more, and the railroad embargoes and shortage of cars, the mills have naturally fallen much further behind in deliveries. However, the recent weather has bettered shipping conditions to some extent and it is believed the worst of the trouble is probably over. The new demand for iron and steel bars is not very active, but obligations now on the books of the mills will take their entire output for the first half of this year at least. We quote steel bars rolled from old steel rails at 3c.; from steel billets, 2.90c., and refined iron bars, 3.50c., f.o.b. Pittsburgh.

Rods.—Owing to greatly reduced output and the heavy demand for rods that has existed for some time, the available supply is very limited, and consumers trying to place orders for fairly prompt shipments are having trouble in finding mills that will accept them. Three local makers say they do not care to take new orders for soft Bessemer or open-hearth rods, but will take on a limited quantity of high carbon rods. Export shipments to Canada and also to the Orient are reported fairly heavy, but mills say these are on contracts placed some time ago, and for which they obtained considerably higher prices than for domestic rods. Prices on rods are given in detail on page 473.

Wire Products.—The mills report a fairly heavy demand for wire and wire nails from the general consuming trade, but the Government is still much the heaviest buyer of wire nails, all the mills operating to a fairly large extent on Government orders placed recently. The mills are filled up over the next two or three months and have fallen behind in deliveries owing to shortage in cars and steel, making their rate of operations for the past month not over 50 to 60 per cent of normal. A local company has had its wire mills closed for nearly a month, desiring to use the steel for other urgent products. The export demand for wire nails is fairly active, and some mills have recently taken large contracts for shipment to the

Orient and also to India, these to go by way of the Pacific Coast. There is still a good deal of dissatisfaction over prices fixed by the Government on wire and wire nails, which the mills claim do not allow a large enough margin of profit, and for this reason some mills have cut down output very materially, preferring to put the steel into other products, on which they say the margin of profit is more satisfactory. Prices on wire products are given in detail on page 473.

Nuts and Bolts.—Local makers of nuts and bolts say they have no knowledge of orders being placed recently for upward of 100,000,000 bolts by the Navy Department, but on the contrary say they have not had any inquiries for nuts and bolts from the Navy Department for some time. It is true that about a month ago the Jeffersonville Arsenal at Jeffersonville, Ind., placed orders for very large quantities of bolts, and these were noted at the time in our reports. Makers say that nearly all the new business they are taking is coming from the Government on direct or indirect orders. The new demand from the general trade has been very dull for some time, and output is kept down by the shortage in steel and fuel. Discounts on nuts and bolts as fixed by the Government are given on page 473.

Rivets.—The Government is understood to have placed about all of the 3000 tons, or 30,000 kegs of rivets referred to in our report of last week. A good part of this large business was taken by local makers, and these rivets are largely for maintenance at the different Government navy yards. The demand for rivets for the general trade has been very dull for some time. The local rivet plants are running very light, their warehouses being full of finished goods, for which they can not get cars for shipment. We quote structural rivets at \$4.65 and cone-head boiler rivets at \$4.75 per 100 lb., f.o.b. Pittsburgh.

Hoops and Bands.—Local makers say that most of the new business in hoops and bands is coming from the Government, the new demand from the general consumers being quiet. However, the mills are filled up over the next three or four months, and in the present unsatisfactory operating conditions they are not anxious to take on new obligations. Output of hoops and bands for the past month or more has not been over 60 per cent of capacity. We quote steel hoops at 3.50c. and steel bands at 2.90c. extras on the latter as per the steel bar card, f.o.b. Pittsburgh.

Shafting.—The inquiry from the general trade is still decidedly light, the Government still placing 75 per cent or more of the new orders going to the shafting makers. The output of shafting for the past six weeks or more has not been more than 50 to 60 per cent of capacity. Thousands of tons are piled in warehouses waiting cars for shipment. The new demand from the automobile and screw stock machine trades has been very light for some months, and does not promise to increase in the near future. We quote cold-rolled shafting at 17 per cent off list, f.o.b. Pittsburgh.

Cold-rolled Strip Steel.—Makers report that the new orders from the Government has fallen off to some extent recently, while the demand from the general trade has been very dull for some time. None of the makers of cold-rolled strip steel is operating at more than 50 per cent of capacity, and some at a very much less rate. Several plants in this district have very heavy stock on hand and are unable to ship owing to the railroad embargoes. Until these heavy stocks are very materially reduced there is not likely to be much increase in the rate of operation.

We quote cold-rolled strip steel at \$6.50 per 100 lb., f.o.b. Pittsburgh, terms 30 days, less 2 per cent for cash in 10 days, when sold in quantities of 300 lb. or more.

Hot-rolled Strip Steel.—The new demand is not very active, due largely to the fact that operations of the makers of cold-rolled strip steel have not been on more than a 50 per cent basis for some time, and probably less. Output is still very much cut down on account of shortage of steel and fuel, and stocks are heavy, as it is very hard to get cars. The Government price of \$4.50 base on hot-rolled strip steel f.o.b. Pittsburgh is reported only fairly firm.

Spikes.—Some inquiries for spikes have come out from the railroads for their 1918 needs, but these are much smaller than usual, indicating that the railroads likely this year will go slow in the matter of laying new track and making betterments. The new demand for boat spikes is very active, due to large building programs of the shipyards, and local makers are well sold up over first half of this year, and some for a longer period.

We quote standard sizes of railroad spikes, 9/16 x 4 1/2 in. and larger, at \$3.90 per 100 lb. in lots of 200 kegs of 200 lb. each, or in larger lots. Boat spikes are held at \$5.25 per 100 lb., f.o.b. Pittsburgh.

Wrought Pipe.—The Government is still placing occasional orders for iron and steel pipe and other tubular goods, but nothing very large has come from this source for some time. The general current demand is only fair, but the pipe mills operating on a 50 per cent or less basis are not anxious to take on new orders, their desire being rather to move the heavy stocks of pipe piled up in warehouses awaiting cars for shipment. Two large pipe mills in this city are still practically closed for lack of fuel, while none of the plants is operating to more than a 50 per cent basis. It is believed that this year there will be very active developments in oil and gas projects in Oklahoma and other western states, providing the mills are able to supply the pipe for gas and oil lines, but just now this seems doubtful. All the pipe mills are sold up over first half of this year, and some have practically no material to offer over the entire year above the demands that will be made on them by their regular trade. The mild weather of the past week has opened up the railroad congestion to some extent, and if it continues the heavy stocks of pipe piled in warehouses will move out in the near future. Several mills report their shipments in the last few days to have been heavier than for some time. Discounts on iron and steel pipe are given on page 473.

Boiler Tubes.—There has been slight betterment in operating conditions among mills making boiler tubes, and if the mild weather lasts for several weeks this will no doubt be very much better. Mills rolling iron and steel tubes are sold up for months ahead, probably 75 per cent or more of their output being booked for the Government on direct and indirect orders. Discounts on iron and steel tubes are given on page 473.

Coke.—The general situation in the coke trade as regards the supply of cars is slightly better, and it will be very much improved if the present mild weather lasts for several weeks. One large concern reports that on Monday it had a 70 per cent supply of cars and another concern 65 per cent. Tuesday was not quite so good, the general average of car supply being only 30 to 35 per cent. There is no shortage of labor in the coke regions, the great trouble being shortage of cars and motive power. Immense stocks of coke are piled up at all the plants, one leading maker stating it has coke enough to load close to 800 cars if it could get them. Another trouble is that when loaded cars leave the coke regions they are not returned for a very long time and this holds up shipments. As yet there has not been any improvement in the quality of furnace coke being made, which the coke makers themselves say is much below the standard, but under present conditions they cannot improve. No free coke is being made, the output being shipped on orders and contracts as fast as cars can be obtained. It will require a great improvement in motive power, as well as in supply of cars, before the transportation of coke is back to normal. No contracts are being made, and there is no incentive under Government restriction of prices to make contracts. We quote 48-hr. furnace coke at \$6.00, 72-hr. foundry at \$7.00 and crushed coke from 1-in. size at \$7.30, in net tons at oven. *The Connellsville Courier* gives the output of coke in Connellsville and Lower Connellsville regions for the week ending Feb. 2 as 214,658 tons, a decrease below the previous week of over 7000 tons.

Old Material.—Local scrap dealers say that as yet there is very little betterment in conditions in the scrap trade. The railroads now require that consignees

secure permits for the loading of scrap in cars, and these are very hard to obtain. The supply of scrap will not show any increase until operations among plants that make scrap are at a heavier rate than has ruled for some time. The new committee of the American Iron and Steel Institute, whose names were published in the IRON AGE last week, is now taking up the questions involving the scrap trade, which dealers believe must have attention before conditions can improve. Probably the most important of these is the ruling that requires prices to be quoted f.o.b. delivery point, many dealers and consumers believing that the only fair way is to have prices quoted f.o.b. at shipping point, consumers to pay the freight. Efforts will also be made by this committee to modify the rulings of railroads regarding the supply of cars, so that consumers of scrap can get quicker shipments. Very little scrap is moving from dealers to consumers, and stocks of the latter are extremely low and getting steadily less. No sales of moment have been made in this market for some time, dealers saying they are not anxious to do business under present very unsatisfactory conditions. Prices on iron and steel scrap for delivery in the Pittsburgh and other districts that take Pittsburgh rate are as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh, delivered.....	\$30.00
No. 1 foundry cast.....	30.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., Franklin, Pa., and Pittsburgh.....	35.00
Hydraulic compressed sheet scrap.....	\$26.00 to 27.00
Bundled sheet scrap, sides and ends f.o.b. consumers' mill, Pittsburgh district.....	24.00 to 25.00
Bundled sheet stamping scrap.....	22.00 to 23.00
No. 1 railroad malleable stock.....	30.00
Railroad grate bars.....	19.00 to 20.00
Low phosphorus melting stock.....	40.00
Iron car axles.....	47.50
Steel car axles.....	47.50
Locomotive axles, steel.....	47.50
No. 1 busheling scrap.....	27.00 to 28.00
Machine shop turnings.....	20.00
Cast iron wheels.....	30.00
Rolled steel wheels.....	35.00 to 37.00
*Sheet bar crop ends.....	39.00 to 40.00
Cast iron borings.....	20.00
No. 1 railroad wrought scrap.....	35.00
Heavy steel axle turnings.....	25.00 to 26.00
Heavy breakable cast scrap.....	30.00

*Shipping point.

The annual meeting of the mechanical section of the Engineers' Society of Western Pennsylvania was held in its rooms in the Union Arcade Building in that city last week. Frank Thornton, Jr., an engineer in the heating department of the Westinghouse Electric & Manufacturing Co., read a paper on "Electricity as a Substitute for Natural Gas for Heating Purposes." His paper included a résumé of the present state of the art of industrial electric heat, together with descriptions of industrial applications in successful operations.

Chicago

CHICAGO, Feb. 12.—(By Wire.)

Milder weather, during which there has been both sunshine and rain, has made sizable inroads on the snow piles and created a more cheerful feeling in the iron and steel industry. Already cars are moving better and fuel is being delivered with more regularity as well as in greater quantity. With the leading interest a pronounced betterment is expected by the end of this week. A large independent advanced its operations to 70 per cent of capacity last week and expects to attain 90 per cent if the favorable weather keeps up. The Government has distributed among several car builders 4500 cars for use in France for which it recently made inquiry. Other Government business consists of 5000 tons of plates and shapes to be delivered by the leading local independent to fabricators working for the Emergency Fleet Corporation; 8000 to 9000 tons of similar material to be delivered by the same company direct to shipyards, and 3000 tons of bars required for Government vehicles. The agricultural implement makers are operating about 90 per cent of capacity and, while not buying actively at this time, are getting all the material they need. The movement

of pig iron for last-half delivery continues heavy. It is agreed that the official regulation of scrap prices has not worked in a satisfactory way, and much is expected from adjudications of the new committee on iron and steel scrap which is to meet in New York Feb. 14.

Pig Iron.—The demand for last-half delivery of nearly every grade of iron continues the impressive feature of the market. Producers and their representatives are not selling with a free hand. Some of the Southern furnaces are selling but little for the last half in view of the uncertainty of their coke supply. One Southern maker continues to sell freely. In January it booked contracts for a greater quantity than it made in that month. Northern interests, while willing to figure on inquiries, do not always allot to consumers all the iron they want. The mild weather and rain of the past two or three days have caused considerable snow to disappear, with a consequent better movement of cars in this territory, but shipments are still slow. The movement of Southern iron into the Chicago district in recent weeks has been heavy. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic irons, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5.....	\$37.50
Lake Superior charcoal, No. 6 and Scotch.....	40.00
Northern coke foundry, No. 1.....	33.50
Northern coke foundry, No. 2.....	33.00
Northern coke foundry, No. 3.....	32.50
Northern high-phosphorus foundry.....	33.00
Southern coke No. 1 foundry and No. 1 soft.....	38.50
Southern coke No. 2 foundry.....	37.00
Malleable Bessemer.....	33.50
Basic.....	33.00
Low phosphorus (copper free).....	53.00
Silvery, 7 per cent.....	44.54

Ferroalloys.—Eighty per cent ferromanganese is a little less plentiful, but the price is unchanged at \$250, delivered. The last-half Bessemer ferrosilicon recently offered is about exhausted.

Plates.—Widths under 72 in., also universal plates, are about all that can be obtained with any degree of ease. The makers of material adaptable to ship construction are out of the market for obvious reasons. The mill quotation is 3.25c. Jobbers quote 4.45c. for plates out of warehouse.

Structural Material.—An Eastern mill is taking business on standard shapes, but the demand is small from fabricators except where Government work is concerned. The leading local independent has received notice that it is to supply about 5000 tons of plates and shapes to fabricators who are working for the Emergency Fleet Corporation, while the same company has new orders direct from various shipyards calling for 8000 to 9000 tons. The Government has placed the 4500 cars for which it recently inquired, and which it will use in France, as follows: American Car & Foundry Co., 950 box; Cambria Steel Co., 500 low-side gondolas; Mt. Vernon Car Mfg. Co., 250 box; Pullman Co., 500 box; Pressed Steel Car Co., 500 box; Standard Steel Car Co., 200 box and 750 high-side gondolas; Haskell & Barker Car Co., 500 low-side gondolas and 250 refrigerator cars, and the St. Louis Car Co., 100 box cars. The South Halsted Street Iron Works, Chicago, will fabricate 2400 tons for the Western Union Telegraph building in Chicago, about 1800 tons of which will be Bethlehem shapes. The Bethlehem Steel Bridge Co. will supply 294 tons for a bridge over the Red River at Index, Tex. The Butler Brothers and the Western Electric Co. buildings are pending. The mill price for shapes is 3c. Warehouse stocks are quoted at 4.20c.

Bars.—The Government recently placed with a local mill 3000 tons of steel bars to be manufactured into ties. New inquiry is out for French shrapnel steel. The export demand is greater than can be cared for. Agricultural implement makers are operating about 90 per cent of capacity and are getting all the material they need. The situation in mild steel bars looks better, an Eastern maker expecting to re-enter the market shortly. A little business has been taken for export to the Orient at 3.90c. base. The rail carbon situation is bad because of the shortage of old rails. The quotation for them is 3c., Chicago, plus extras.

Common bar iron at 3.50c., Chicago, is not extremely active, but business is steady. The mills quote 2.90c. on mild steel bars. Warehouse prices follow:

Soft steel bars, 4.10c.; bar iron, 4.10c.; reinforcing bars, 4.10c., base, with 5c. extra for twisting sizes $\frac{1}{2}$ in. and over and usual card extras for smaller sizes; shafting, list plus 10 per cent.

Wire Products.—Production by the leading independent and other makers has been intermittent. Meanwhile orders have been accumulating. Jobbers are beginning to inquire for fencing and poultry netting. We quote at Government levels as follows:

Nails, \$3.50, Pittsburgh; plain fence wire, \$3.25; painted barb wire, \$3.65; galvanized barb wire, \$4.35; polished staples, \$3.65, and galvanized staples, \$4.35.

Rails and Track Supplies.—Inquiry and more or less business in rails continue to engage attention. We quote:

Standard railroad spikes, 4.11 $\frac{1}{2}$ c., Chicago. Track bolts, with square nuts, 5.11 $\frac{1}{2}$ c., Chicago. Tie plates, 3.25c., f.o.b. maker's mill. The base for light rails is 3c., f.o.b. maker's mill for 25 to 45-lb sections, lighter sections taking Government extras.

Sheets.—The domestic demand for sheets is good, but not all makers are quoting. They also have ceased to give prices for export, although the Far East continues to look for material. We quote No. 10 blue annealed at 4.25c., No. 28 black at 5c. and No. 28 galvanized at 6.25c., Pittsburgh.

We quote for Chicago delivery out of stock, regardless of quantity, as follows: No. 10 blue annealed, 5.45c.; No. 28 black, 6.45c., and No. 28 galvanized, 7.70c.

Cast-Iron Pipe.—Toledo, Ohio, has rejected all bids on 500 tons. At St. Paul, Minn., 438 tons is pending, and at Minneapolis 1390 tons is pending. On Feb. 16 there will be a letting at Milwaukee of 900 tons of pipe and miscellaneous specialties.

Quotations per net ton, Chicago, are as follows: Water pipe, 4-in., \$57.30; 6-in. and larger, \$54.30, with \$1 extra for Class A water pipe and gas pipe.

Old Material.—More interest is shown by consumers, especially in wrought scrap, but the general market is still quiet. Cast scrap also is stronger because of the scarcity of pig iron. Shipments continue bad, but there is prospect of betterment now that some of the snow has gone. A meeting of the new scrap committee will be held in New York Feb. 14, and it is expected that several differences of opinion will be smoothed out at that time. Among other questions which probably will be considered is the permissibility of consumers paying freight rates which bring their costs to figures higher than those specified by the Government. This already has been done by consumers in out-of-the-way places. The railroad lists aggregate a small tonnage. We quote for delivery in buyers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails.....	\$38.00 to \$39.00
Relaying rails.....	60.00
Old carwheels.....	30.00
Old steel rails, re-rolling.....	35.00
Old steel rails, less than 3 ft.....	34.00 to 35.00
Heavy melting steel.....	30.00
Frogs, switches and guards, cut apart.....	30.00
Shoveling steel.....	30.00
Steel axle turnings.....	25.00 to 26.00

Per Net Ton

Iron angles and splice bars.....	\$37.00 to \$38.00
Iron arch bars and transoms.....	39.00 to 40.00
Steel angle bars.....	30.50 to 31.00
Iron car axles.....	47.00 to 48.00
Steel car axles.....	42.42
No. 1 railroad wrought.....	31.25
No. 2 railroad wrought.....	31.25
Cut forge.....	31.25
Pipes and flues.....	24.00 to 24.50
No. 1 busheling.....	25.50 to 26.50
No. 2 busheling.....	18.00 to 19.00
Steel knuckles and couplers.....	33.50 to 34.50
Coil springs.....	35.70
No. 1 boilers, cut to sheets and rings.....	22.00 to 23.00
Boiler punchings.....	32.00 to 33.00
Locomotive tires, smooth.....	36.50 to 37.50
Machine-shop turnings.....	16.50 to 17.00
Cast borings.....	17.00 to 17.50
No. 1 cast scrap.....	26.00 to 26.75
Stove plate and light cast scrap.....	22.25 to 23.25
Grate bars.....	22.00 to 23.00
Brake shoes.....	24.00 to 25.00
Railroad malleable.....	26.80
Agricultural malleable.....	26.80
Country mixed scrap.....	21.50 to 22.50

Bolts and Nuts.—Makers are hampered by embargoes and lack of raw material wherewith to manufacture some of their products. One manufacturer is

not quoting on cold-punched nuts. For prices and freight rate see finished iron and steel f.o.b. Pittsburgh, page 473. Jobbers quote as follows:

Structural rivets, 5.50c.; boiler rivets, 5.60c.; machine bolts up to $\frac{3}{4}$ x 4 in., 40 and 10 per cent off; larger sizes, 35 and 5 off; carriage bolts up to $\frac{3}{4}$ x 6 in., 40 and 2 $\frac{1}{2}$ off; larger sizes, 30 and 5 off; hot pressed nuts, square tapped, \$1.05 off, and hexagon tapped, 85c. off per 100 lb.; coach or lag screws, gimlet points, square heads, 50 per cent off.

Philadelphia

PHILADELPHIA, PA., Feb. 12.

Mild weather has resulted in a much heavier freight movement during the past few days, but no important effect upon the shipments of coal and coke to steel plants and blast furnaces is to be reported, nor can any great improvement be expected until the backbone of the winter has been finally broken. A number of blast furnaces are still banked and steel plant and rolling mill operations are seriously retarded, but continued mild weather would undoubtedly relieve the situation within a few weeks. The Pennsylvania Railroad has issued a notice that permits for the movement of freight will be issued upon application of consignees when it is shown that material is badly needed. The announcement of the railroad says: "To keep transportation lines and terminals open for the use of the general public, it is imperatively necessary to co-ordinate to the fullest possible extent the rail movement with each consignee's requirements and ability to promptly take delivery upon arrival at destination. Delinquent consignees cannot expect favorable consideration of applications for shipping permits if and when they have excess quantities on hand." The Reading Railroad has announced a modification of its embargo. Deliveries are being made by the railroads of steel and pig iron which have been en route for many weeks and in a measure this has brought relief to consumers.

Billets, Etc.—The Government has not yet placed the order for 45,000 tons of billets for export to one of its Allies. We quote open-hearth re-rolling billets at \$50.50, Philadelphia, but no sales are reported.

Ferroalloys.—The ferromanganese market continues dull. The price remains at \$250, delivered. Spiegel-eisen is quoted at about \$60, furnace. No sales of importance are reported.

Pig Iron.—The past week has been very quiet in the pig iron market. Very few sales have been made, and these were mostly of small lots for which shipping permits could be obtained. Through inability to ship, the blast furnaces of this district are piling iron. Stocks on hand, despite the great needs of consumers, are larger in many instances than they have been at any time in many months. Steel makers and foundries are now being hampered in their operations by shortage of pig iron receipts as well as lack of coal and coke. There is great interest in the action which is to be taken at Washington on iron prices after April 1. In some quarters there is a pronounced belief that the Government authorities will not tamper with prices. The authorities in Washington are being kept informed of the high costs which have resulted from the difficulties encountered in the past few months. A curve on increasing furnace costs shows a marked upward trend since last November, and in January the average cost per ton in the eastern Pennsylvania district is said to have exceeded \$27. The average invoice price of shipments from eastern Pennsylvania districts from last September up to and including January ranged from \$33 to \$34. In the face of these figures, furnace representatives say that a reduction in the price of pig iron by the Government would result in the banking of many furnaces. As has been previously reported, nearly all contracts made since Jan. 1 for delivery of iron after March 31 have contained a proviso releasing the furnace from obligation to ship if the Government makes a price so low that furnaces cannot produce the iron at a profit. A new buyer of foundry iron in this district is the new Westinghouse plant at Essington, which is at work on turbines for the United States Government. Recent sales to this plant have aggregated several hun-

dred tons. We quote standard grades of iron, f.o.b. furnace, with the exception of Virginia iron, for which the delivered prices in the Philadelphia district are quoted:

Eastern Pennsylvania No. 1 X.....	\$34.50
Eastern Pennsylvania No. 2 X.....	33.50
Eastern Pennsylvania No. 2 foundry.....	33.00
Virginia No. 2 X (including freight).....	36.77
Virginia No. 2 foundry (including freight).....	36.27
Basic.....	33.00
Gray forge.....	32.00
Bessemer.....	36.30
Standard low phosphorus.....	53.00
Low phosphorus (copper bearing).....	50.00

Fluorspar.—An Eastern ordnance plant is threatened with a shut-down because of a serious shortage of fluorspar. The scarcity is due to the freezing over of streams in the Middle Western mining districts.

Plates and Shapes.—Delays in the completion of the shipyards which are to build fabricated ships are working a severe hardship upon manufacturers of plates and shapes. The Emergency Fleet Corporation has ordered a great deal of this material shipped to fabricating shops during the first quarter of the year, but when the mills apply to the Fleet Corporation to obtain railroad permits to ship, they are frequently informed that the material is not immediately needed, and they are asked to store it until further notice. Many fabricating shops are likewise embarrassed, as they had set aside practically their entire capacity for ship work, and in some instances they have not received blueprints from the shipbuilders for the work. In other instances, the fabricated material has been completed before the yards were ready for it and the fabricators have been asked to store it until needed. The American International Shipbuilding Corporation has made provision for a storage charge to be paid under such circumstances. Considerable commercial business could be handled advantageously by the mills if the Fleet Corporation would revise its schedules of shipments to meet its present actual requirements. Fabricators have received no word from Washington as to the 2000 portable hangars for France, involving a total of about 65,000 tons, awards of which have been expected every day. Production of both plates and shapes fell off severely last week in this district, probably not exceeding 50 per cent of capacity, and this week up to to-day has shown no improvement. We quote plain material at 3c., and plates at 3.25c., base, Pittsburgh.

Iron and Steel Bars.—There is a pronounced scarcity of commercial steel bars from 2 to 6 in. due to the fact that nearly all mills which roll these sizes are at work on shell rounds. The market is dull. Curtailed production of bar iron, due to coal shortage, is reported. We quote soft steel bars at 2.90c., Pittsburgh, and bar iron at 3.685c., Philadelphia.

Sheets.—The market is quiet. Consumers are principally concerned with obtaining deliveries of sheets on order. We quote No. 10 blue annealed at 4.25c., No. 28 black at 5c., and No. 28 galvanized at 6.25c., Pittsburgh base.

Old Material.—Business in old material last week reached the lowest point known in this market in many months. Mild weather, such as has prevailed during the past few days, if it continues for a week or so longer, will undoubtedly bring some improvement. There is a good demand, but the difficulties of shipping, owing to railroad embargoes, have held back business. Eastern Pennsylvania mills are said to be fairly well supplied for the next two or three months, but will probably buy for future requirements as soon as shipping conditions improve. The Eastern division of the American Board of Scrap Dealers, comprising the dealers in Philadelphia and vicinity, has held a meeting at which recommendations for changes in the fixed prices of scrap were adopted. These recommendations will be presented to the new Sub-committee on Iron and Steel Scrap of the American Iron and Steel Institute in New York on Thursday of this week. It was recommended that the price of No. 1 cast scrap and carwheels be established at \$35, maximum, for foundries or other than steel plants; also that the price of No. 1 wrought be advanced from \$35 to \$37.50, the extra charge to be made for the labor of sorting out. Under the present

classifications, a great deal of wrought scrap now goes into heavy melting steel, and this will eventually work a hardship to iron rolling mills. A difference of opinion developed at this meeting as to whether the present shortage of scrap is actual or artificial. Some contended that the stocks in dealers' yards are sufficiently large to provide for immediate requirements; that many consumers are covered for two or three months, and that a free movement of scrap will undoubtedly come in the spring. Others held that there will not be enough scrap in the country to supply the enormous consuming demand. Large producers, such as the railroads, fabricating shops and the shipyards, it was held, are not offering as much scrap for sale as was formerly customary. The Pennsylvania Railroad, for example, usually had about 25,000 tons per month to sell, while recently its offerings have not exceeded 10,000 tons per month. Some believe, however, that the scrap has accumulated, but that the railroad situation has made it impossible to move it. The Government has a stock of 50,000 tons of steel scrap, which will soon be made available to plants in the Philadelphia and Pittsburgh districts. We quote the following for delivery at consuming point in the eastern Pennsylvania district:

No. 1 heavy melting steel.....	\$30.00
Steel rails, rerolling.....	35.00
Low phosphorus heavy, 0.04 and under.....	40.00
Low phosphorus (not guaranteed).....	35.00
Old iron rails.....	\$40.00 to 42.00
Old carwheels.....	30.00
No. 1 railroad wrought.....	35.00
No. 1 yard wrought.....	33.00 to 35.00
No. 1 forge fire.....	26.00 to 28.00
Bundled sheets.....	26.00 to 28.00
No. 2 busheling.....	17.00 to 18.00
Turnings (for blast furnace use).....	17.50 to 18.50
Machine shop turnings (for rolling mill use).....	18.50 to 19.50
Cast borings (for blast furnace use).....	17.50 to 18.50
Cast borings (clean).....	20.00
No. 1 cast.....	30.00
Grate bars.....	23.00 to 24.00
Stove plate.....	23.00 to 24.00
Railroad malleable.....	29.00 to 30.00
Wrought iron and soft steel pipes and tubes (new specifications).....	33.00 to 35.00

Cleveland

CLEVELAND, Feb. 12—(By Wire).

The mild weather which has prevailed in the Central West during the past week is beginning to cause some relief in the traffic congestion, although this was scarcely noticeable until Monday. While industrial improvement so far is only slight, considerable change for the better is expected within the next few days, provided weather conditions continue favorable. The coke movement is better but coal shipments show little improvement from the West Virginia and Kentucky fields, being interfered with by floods. The McKinney Steel Co. still has one-half of its Cleveland coke plant shut down, one Cleveland furnace banked, and the other three producing very little iron. Both its Josephine and its Scottdale furnaces are also banked. Operating conditions are better with the American Steel & Wire Co. which now has two of its Cleveland stacks running.

Iron Ore.—The difficulties that blast furnaces have been subjected to in the past few weeks causing a large curtailment in the pig iron production are reflected in the ore shipments from docks, which have been exceedingly light all winter. Because of this light movement to the furnaces, the amount of ore on docks at the opening of the season of navigation will doubtless be much larger than ever before on a corresponding date. There was on Lake Erie docks Feb. 1, 10,969,592 gross tons of ore, or an increase of 950,666 tons over the same date last year, when dock stocks were 9,118,926 tons. January shipments were only 199,091 tons, as compared with 686,227 tons during the corresponding month a year ago. Unfavorable weather and car shortage doubtless had something to do with the light January shipments, but few consumers have wanted their ore. Shipping orders for February show a little improvement. On April 1 last year there was 6,742,007 tons of ore on the docks, and on the same day in 1916, 4,919,993 tons. A standard rider containing provision for a Government price revision that will be a part of ore contracts is still in preparation. In the meantime,

sellers are making additional reservations. Some consumers are asking that the reservations they made recently be reduced because of the uncertainty about operating conditions. Prices are as follows, lower cabin ports:

Old range Bessemer, \$5.95; old range non-Bessemer, \$5.20; Mesaba Bessemer, \$5.70; Mesaba non-Bessemer, \$5.05.

Pig Iron.—The demand for foundry iron for the last half delivery continues heavy. There is also some inquiry for malleable iron for that delivery. Steel-making iron is quiet, although the demands of several consumers in this territory, both for the second quarter and last half, are still unsatisfied. New Government demand includes 4200 tons of foundry iron and 300 tons of charcoal iron for the Cleveland and Detroit plants of the American Shipbuilding Co. for May-June delivery, which is being allotted to nearby producers, and 400 tons of charcoal iron for a St. Louis plant for February-April delivery. The sharp decrease in pig iron production makes the shortage more acute and has increased difficulties in securing iron for future needs. There is a fair volume of inquiry for Southern iron for the last half delivery, much of this being from foundries that want high silicon iron which they are unable to secure from Northern furnaces. We quote, f.o.b. Cleveland:

Bessemer	\$37.25
Basic	33.30
Northern No. 2 foundry	33.30
Southern No. 2 foundry	37.00
Gray forge	32.30
Ohio silvery, 8 per cent silicon	46.12
Standard low phosphorus, Valley furnace	50.00

Coke.—There is considerable inquiry for prompt shipment foundry coke from consumers who are unable to get shipments on contracts, but selling agents have none to offer. Shipments are a little better, but many foundries are hard pressed for fuel.

Finished Iron and Steel.—It is estimated that about 95 per cent of the steel under contract with mill agencies in Cleveland has been diverted from commercial to Government use, because of manufacturers turning their plants over to Government work. There is a fair demand for small lots of steel largely for bars and plates to fill Government orders. Late estimates are that the automobile manufacturers this year will make 40 to 50 per cent of their 1917 output, provided they can get the steel. There is little building activity, and Cleveland fabricators are almost out of work, but bridge builders are busy with ship work. Six thousand tons of steel will be required for reconstructing for salt water service 18 lake boats recently taken over by the Government. Among pending inquiries are some for plates for portable boilers for use in France. Some inquiry is coming from makers of heavy machinery for steel for July delivery. Sheet production is still materially reduced by lack of coal and sheet bars, and two Ohio mills are reported to have shut down. The demand for sheets continues fairly heavy, but some sheet mills not having steel plants are taking orders only for material for Government work, for without the priority orders they will be unable to secure sheet bars.

We quote warehouse prices as follows: Steel bars, 4.03½c.; plates, 4.38½c.; structural material, 4.13½c.; No. 10 blue annealed sheets, 5.35c.; No. 28 black sheets, 6.35c.; No. 28 galvanized sheets, 7.60c.

Bolts, Nuts and Rivets.—The Government is revising its recent inquiry for 50,000,000 bolts and nuts, and will send out new specifications within a few days. Orders show an increase over January. The Emergency Fleet Corporation has placed 500 tons of rivets with a Cleveland maker for shipment to the Pacific Coast. Arrangements were made Tuesday for the shipment to shipbuilders of a large tonnage of rivets held in this city for weeks because of the railroad congestion.

Old Material.—The mild weather of the past few days has had the effect of causing a softening tendency in the scrap market. There has been a large accumulation of material, which producers have been unable to move, and with weather conditions permitting the handling of scrap, together with the expected improvement in transportation, there will probably be a large volume of scrap thrown upon the market. There was practically no activity during the week, and quotations are unchanged except on busheling, which is

about 50c. a ton lower. A sale of 400 tons of busheling is reported at \$30.50, but that is higher than today's market price. The railroad situation has improved slightly, so that dealers are now able to make some shipments to Pittsburgh. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton	
Steel rails	\$27.00 to \$28.00
Steel rails, rerolling	35.00
Steel rails, under 3 ft.	34.50 to 35.50
Iron rails	35.00
Iron car axles	45.00 to 46.00
Steel car axles	45.00 to 46.00
Heavy melting steel	30.00
Cast borings	20.00
Iron and steel turnings	20.00
No. 1 railroad wrought	35.00
Hydraulic compressed steel scrap	28.50 to 29.50
Carwheels	30.00
Relaying rails, 50 lb. and over	50.00 to 60.00
Agricultural malleable	24.00 to 25.00
Railroad malleable	30.00
Steel axle turnings	23.00 to 24.00
Light bundled sheet scrap	24.50 to 25.00
No. 1 cast	30.00
No. 1 busheling	29.00 to 30.00
Per Net Ton	
Railroad grate bars	\$20.00 to \$21.00
Stove plate	20.00 to 21.00

Cincinnati

CINCINNATI, Feb. 12—(By Wire)

Some comparatively large sales of Southern foundry iron were made last week by firms which were willing to take business for last-half shipment. In southern Ohio and Indiana, several sales of 500 to 1000 tons are reported and there was also a number of contracts made in northern Ohio for like tonnages. Probably more Southern iron was sold here last week than in any similar period for the past two months. As usual, all contracts are subject to the Government's revision of prices with a further stipulation that if figures are reduced to a point not satisfactory to the furnaces, they are to have the privilege of cancelling. No Northern foundry is on the market for any delivery. Shipments from all districts are almost at a standstill, although there is a little improvement in the movement of iron from the Birmingham district. So far none can be transferred through Cincinnati for points north. A southern Ohio furnace sold a limited tonnage of Bessemer ferrosilicon to a Michigan melter for last-half shipment and it is understood two smaller lots were obtained by Ohio melters for the same delivery. An inquiry is out for high silicon from the Pittsburgh district, but up to the present time no furnace has made a bid for the business. The Ohio silvery irons are practically unobtainable for any shipment. Both the Louisville and Nashville Railroad and the Southern Railway are in the market for foundry iron. The first named railroad wants approximately 1800 tons, about one-third of which is high manganese iron and for second and third quarter shipment. One local foundry is idle on account of high water, and two others are on the verge of closing down due to insufficient coke supply. Based on freight rates of \$2.90 from Birmingham and \$1.26 Ironton, we quote f.o.b. Cincinnati as follows:

Southern coke, No. 2 foundry and 2 soft	\$35.90
Southern Ohio, No. 2	34.26
Basic, Northern	34.26

Coke.—No effort is being made to take on any future contracts for either furnace or foundry coke. Every possible energy is used to get shipments through to destination, but with very little success. Open weather has not yet had time to affect the situation, but under the very best of weather conditions the oven operators will require considerable time to produce enough coke to supply the demand. Railroad troubles are clearing up very slowly, and conditions in the West Virginia fields are said to be almost as bad as they were three weeks ago. The local foundry supply of coke is diminishing, but all foundries are still able to operate. A shutdown confronts several plants unless the supply is increased very soon. The foundrymen generally are complaining as to the quality of coke recently received. They state that it runs very high in sulphur.

Finished Material.—A great deal of complaint is made as to the very poor service rendered by the rail-

roads. Shipments from the mills to local warehouses have been delayed indefinitely, while it is impossible to make any outbound shipments, even to points not embargoed. One firm has had a car loaded for eight days without being able to get it moved, although this shipment is intended for a Southern manufacturer who is doing war work. Less than carload shipments are not accepted for any point. Local business has improved a trifle, and there are some inquiries out for small tonnages of reinforcing concrete rods, showing that building operations have not entirely ceased. No price changes of any kind have been made.

Jobbers' prices are unchanged as follows: Iron and steel bar, 4.08½¢; twisted bars, ¾ x 1¼-in., 4.23½¢; ¾-in., 4.33½¢; ½-in., 4.43½¢; ¾-in., 4.63½¢, and ½-in., 4.88½¢. Structural shapes are quoted at 4.18½¢; plates, ½-in. and heavier, 4.43½¢; No. 10 blue annealed sheets, 5.43½¢. Cold rolled shafting is sold at 10 per cent discount. The mill price on No. 28 black sheets is 5.18½¢, and No. 28 galvanized 6.43½¢.

Old Material.—Dealers are simply waiting for the railroad situation to clear up, so as to enable them to make shipments to outside consumers. It is impossible to ship scrap to any of the large consuming centers. The local demand is too light to be much of a factor in determining prices, but with few exceptions the Government's schedule is used, with a usual reduction of \$2.50 per gross ton, representing the freight rate to Pittsburgh district, where most of the scrap accumulated here is shipped. The following are dealers' prices f.o.b. southern Ohio and Cincinnati:

Bundled sheet scrap.....	\$19.00
Old iron rails.....	\$32.00 to 32.50
Relaying rails, 50 lb. and up.....	44.00 to 44.50
Rerolling steel rails.....	33.00 to 33.50
Heavy melting steel scrap.....	27.00
Steel rails for melting.....	27.00 to 27.50
Old carwheels.....	28.00

Per Net Ton

No. 1 railroad wrought.....	\$29.00 to \$29.50
Cast borings.....	13.00 to 13.50
Steel turnings.....	13.00 to 13.50
Railroad cast.....	24.50 to 25.00
No. 1 machinery.....	25.00 to 25.50
Burnt scrap.....	15.00 to 15.50
Iron axles.....	40.00 to 40.50
Locomotive tires (smooth inside).....	33.50 to 34.00
Pipes and flues.....	19.00 to 19.50
Malleable cast.....	23.50 to 24.50
Railroad tank and sheet.....	17.00 to 17.50

Birmingham

BIRMINGHAM, Feb. 12.

Sales of pig iron in the Southern territory, delivery after July 1, will shortly begin piling up. One or two companies are still out of the market so far as second half of the year delivery is concerned, but the steady inquiries coming in is likely to bring about a change of mind. The last month of the first quarter of the year will probably develop an activity in selling that will cut deep into the probable make of the last half of 1918. There is but little iron yet left of the first-half's probable output, and numerous orders are being booked now on this remainder. Clauses inserted in contracts by the manufacturers have no terror for the consumers. Many contracts are to be seen on a casual visit to iron company offices, and 100 to 500-ton orders appear to be most voluminous. That the iron market is strong and will continue that way for many months to come is the opinion of iron men in this section. While no comments are being made as to what the Government is likely to do on April 1 on the proposed revision of schedule of prices, there is a belief that the market is not going to be disturbed much, if any. The good weather of February has brought about a great improvement in the production of iron in the South. The Trussville furnace, a short distance from Birmingham, will be making iron by the end of this month, if preparations in hand are carried out. Within a few weeks, two furnaces at Sheffield, in the northwestern part of Alabama, will be making iron also, development and improvement of the property of the Sheffield Coal & Iron Co. having been given much attention in the past few months. These three furnaces will add materially to the make in this State. There is no doubt that an increase will be shown in the production in February, though there are but 28 days to the month as compared to the output of furnaces last month, Alabama

being given credit for 218,502 tons of iron. All sales of pig iron in this district are strictly in accordance with the Government schedule, \$33 and \$33.50 per ton, No. 2 foundry. Raw material is more plentiful now that good weather prevails and outside labor is not disturbed.

Scrap Iron and Steel.—The old material market in the South is a little weak. While quotations for scrap iron and steel show little change, dealers assert that there is not as much strength to the market as was noted a few months ago. Local consumers are paying more for heavy melting steel than they have for some time. Quotations for old material are as follows:

Old steel axles.....	\$32.00 to \$33.00
Old steel rails.....	28.00 to 30.00
Heavy melting steel.....	24.00 to 26.00
No. 1 R. R. wrought.....	29.00 to 33.00
No. 1 cast.....	24.00 to 26.00
Old carwheels.....	25.00 to 30.00
Tramcar wheels.....	21.00 to 25.00
Machine shop turnings.....	17.50 to 19.00
Cast iron borings.....	13.00 to 15.00
Stove plate.....	19.00 to 21.00

Buffalo

BUFFALO, Feb. 11.

Pig Iron.—The milder weather conditions of the past two or three days have as yet afforded no appreciable relief from the difficulties of transportation which have been curtailing the supplies of fuel and raw materials and kept operation at many furnaces and steel mills at far below capacity. Improvement is in sight, but owing to the fact that coke production at ovens has been irregular and without steady continuity for some time, supplies are likely to come forward only in an intermittent manner for some time, and furnace production will be curtailed until normal transportation facilities are restored. There is a constant influx of inquiry for all grades of iron for different periods of shipment, but there is an almost entire lack of supply, and buyers are now apparently beginning to realize that they have actually reached an acute shortage of pig iron. The demand for basic iron is particularly heavy, and there is a scramble for last half material. Several inquiries for large tonnages were before the market this week and unable to find placement, producers not being in position to entertain them. One sale of 1000 tons of foundry iron for first quarter delivery was, however, reported. Coke of all grades is in the same position as pig iron and practically unprocureable. Prices are as per recent schedules f.o.b. furnace, Buffalo, as follows:

No. 1 foundry.....	\$34.50
No. 2 X.....	33.50
No. 3 foundry.....	32.50
Gray forge.....	32.00
Malleable.....	33.50
Basic.....	33.00
Lake Superior charcoal, f.o.b. Buffalo.....	39.75

Old Material.—Very little improvement is perceptible as yet over the slack condition of trade reported last week, notwithstanding the moderation of weather conditions is likely to ameliorate the freight congestion shortly, as conditions have been such that it was impossible to make any shipments whatever except by a special permit which takes days to obtain. The manufacture of shells for the Government, the production of which is now coming steadily into the market, means that large tonnage of shell turnings and low phosphorus shell ends will soon be available, which will help out in meeting steel scrap demand to that extent. Transactions for the week have been exceedingly limited. We continue to quote last week's schedule, which is as follows:

Heavy melting steel.....	\$30.00
Low phosphorus.....	40.00
No. 1 railroad wrought.....	35.00
No. 1 railroad and machinery cast.....	30.00
Iron axles.....	\$45.00 to 47.00
Steel axles.....	45.00 to 47.50
Carwheels.....	30.00
Railroad malleable.....	30.00
Machine shop turnings.....	18.00 to 18.50
Heavy axle turnings.....	26.00 to 27.00
Clean cast borings.....	19.00 to 20.00
Iron rails.....	37.00 to 38.00
Locomotive grate bars.....	25.00
Stove plate.....	25.00
Wrought pipe.....	29.00
No. 1 busheling scrap.....	30.00
No. 2 busheling scrap.....	22.00 to 24.00
Bundled sheet stamping scrap.....	22.00 to 24.00

Finished Iron and Steel.—The main feature of the market is the practical cessation of shipment of materials by the mills due to restricted operations because of lack of fuel and the many embargoes that are still effective. Business is likely to be conducted at a more or less halting rate until the traffic situation can be cleared up. The market for reinforcing bars shows some life, as bids are soon to be taken for a number of building and construction projects which will call for considerable tonnages of such material.

British Steel Market

Pig Iron Very Firm with Hematite Scarce— Tin Plates Are Higher

(By Cable)

LONDON, ENGLAND, Feb. 13.

The pig-iron market is very firm. Demand for hematite exceeds the supply and exports continue restricted. American wire rods are nominal but tin plates are firmer at 31s. 9d. basis. The ferromanganese market is firm. We quote as follows:

Tin plates coke, 14 x 20; 112 sheets, 108 lb., f.o.b. Wales, 31s. 9d.

Ferromanganese, \$250 c.i.f. for export to America; £26 10s. for British consumption.

Ferrosilicon, 50 per cent. c.i.f. £35 upward.

On other products control prices are as quoted in THE IRON AGE of July 19, 1917, p. 171.

Subsidies to Pig-Iron Makers Not Settled—Ferromanganese Sold at Nearly \$300

(By Mail)

LONDON, ENGLAND, Jan. 15, 1918.—The slowing down of operations incidental to the turn of the year gave opportunities to make badly needed repairs, but the pressure of working has reasserted itself fully. National requirements still claim almost the whole of the productive capacity. General conditions are more stringent than ever. All indications point to intense activity during the current year and the extent of the output will be determined by the available supplies of pig iron. Little material can now be diverted abroad, although urgent needs of Allies are being seen to as far as possible. Prices are high, with the tendency upward, while higher wages and the increased cost of raw material must influence values.

Nothing definite has been arrived at or announced regarding an adjustment of the position of iron masters, and this question is an unsettling factor. There is no doubt that a system of subsidies is about to be enforced in order to compensate for the increased cost of fuel, and it is believed an official announcement is impending. In the Midlands demands are in excess of current output of forge and foundry material, and very little iron is available in the open market. Some of the smelters stated at the last quarterly meeting that the whole of their output for some time to come would be required to meet present engagements. There is not much change in the Cleveland district, where the abnormally heavy applications for the current month have, contrary to recent expectations, been accepted pretty well in full owing to the arrears carried from the previous month, but consumers fear that deliveries will continue more or less handicapped by the dearth of cars. Moreover, the output of common foundry iron is less abundant, owing to the increased production of basic iron, while two additional furnaces were last week blown in at the Redcar works of Dorman Long & Co. The hematite stringency seems relaxing slightly owing to the improving output, although current production is being absorbed rapidly. The total shipments for 1917 were 525,430 tons, a decrease of 102,710 tons against 1916, the greater part of the total having gone to France, while the decrease is due to the stoppage of exports to neutrals.

Semi-finished steel is virtually unchanged, although undoubtedly more stringent because shell discard ma-

terial and electrical steel were recently taken under control. Practically the entire output is now reserved for war and shipbuilding material. Official prices remain as before at £10 7s. 6d. net f.o.b. for Welsh sheet bars and billets. Merchant trading in American material is at a standstill and no quotations are obtainable even for wire rods.

What between the intense accumulation of essential work and the question of the much overdue adjustment of current official prices because of increased costs, there is a strong feeling in the finished iron and steel trade and the impasse chiefly accounts for the reluctance to accept additional orders. Where these are taken they are made subject to whatever adjustment may eventually ensue. The works urge that it is high time the situation was made clear. Since the present maxima were fixed for finished iron, the cost of production has risen substantially through the sanction of higher prices for raw material and fuel and dearer wages. The works are now forced to decline orders, for their capacity is already heavily ear-marked against certified direct government work. While official rates of bar iron are unaltered, better terms are obtainable for nut and bolt qualities, which are excluded from price restrictions and range from £14 10s. to £14 15s. net delivered in the Birmingham district, while the fixed price of North Staffordshire crown bars stands at £13 15s. net f.o.b. maker's works.

A depressed feeling was produced recently in tin plates when the maximum basis price of cokes, 20 by 14, owing to the collapse in tin, dropped automatically to 30s. 7½d. net, f.o.b. at works, a setback of 1s. per box from the top reached at the height of the tin boom. There has been since a recovery in the maximum basis to 31s. 6d. in sympathy with tin with a little more business done, but the market is again quiet in view of the continuous unsettlement in the metal. Consumers are disinclined to place orders, although permits have been issued more freely for stock plates, which in the case of wasters have accumulated considerably at makers' works. Makers are fairly well booked ahead, but in many cases where orders are wanted the maximum basis standing to-day at 31s. 4½d. with tin at about £298, is being shaded by 6d. to 9d. per box. Big orders are under execution for France and fresh large applications are expected for the same destination.

There is no change in ferromanganese, the undertone being firm with some little business doing with Continental ports against permits at about £60 f.o.b. for loose with an additional £2 10s. to £3 per ton for packed. Developments in regard to orders for American North Atlantic ports have remained mostly in abeyance, although some business has now been done at \$250 c.i.f. for forward shipment. Indian manganese ores are quite nominal at 3s. 6d. to 3s. 7d. per unit, c.i.f. United Kingdom.

New York

NEW YORK, Feb. 13.

Pig Iron.—Inquiry for pig iron is surprisingly persistent in view of the fact that inquirers receive no encouragement from the furnaces and are not often able to place their orders. Leading electric and pump companies have been in the market for rather large tonnages, which, it is understood, have been placed in a quiet way, but definite information is lacking. The moderation of the weather of the past few days has brought some encouragement and foundries which were in danger of being compelled to close on account of insufficient supplies are now hoping to obtain pig iron without serious difficulty. For early delivery, we quote as follows:

No. 1 X	\$35.25
No. 2 X	34.25
No. 2 Plain	33.75
No. 2 Southern (rail and water)	\$38.75 to 39.25
No. 2 Southern (all rail)	39.15 to 39.65
No. 2 X Virginia	37.00 to 37.25

Ferroalloys.—With practically two holidays in the

past week, developments in the ferromanganese market have been very few. There has been no increase in demand and sales have been limited to small lots at the prevailing quotation of \$250, delivered, which is firmly held. According to the blast furnace report of THE IRON AGE for January the domestic output was quite a little larger than anticipated, as judged by the last two months of 1917, when the average was only 19,000 tons. The January production exceeded 22,500 tons, but the spiegeleisen output was only a little over 8000 tons. There have been no developments in the spiegeleisen market, which continues at about \$60, furnace, for the 20 per cent grade. Ferrosilicon, 50 per cent, is active and unchanged at \$175 to \$190 per ton, depending on the quantity and delivery. Some other ferroalloys are quoted in the first issue of each month in this paragraph.

Finished Iron and Steel.—Sellers of plates are in agreement that supply is in excess of demand. In fact, it is rather freely stated that in some cases there are several months' supply of plates at shipyards, measured in terms of the present absorptive capacity of such yards. The total number of buildings for the Signal Corps for France for the United States Government appears to be fully 2000, but awards on the basis of the bids recently taken seem indefinite. Possibly an increase in the number, to cover needs of other governments besides our own, may be made. A total of 65,000 tons of steel is involved in the 2000 structures and the problem is one of rolling, inasmuch as shipments are to be made in 60 days and large tonnage mill production is difficult to attain owing to the relatively light sections involved. The fabrication problem is thus secondary to that of the mill. Bids will be received on Feb. 28 for a boat shop addition at the League Island Navy Yard, taking 600 tons. The eight buildings for the Quartermaster Department, part at Atlanta and part at Baltimore, totaling 3000 tons, were taken some time ago by the American Bridge Co. We quote mill shipments of steel bars at 3.095c., New York; shapes 3.195c., plates 3.445c. and bar iron 3.695c., New York. Out of store prices are 1c. higher.

Old Material.—Moderation in the weather has brought slight improvement in the movement of scrap, but dealers are finding it almost impossible to obtain permits to ship. Cars are, in fact, more easily obtained than permits and the increase in volume of business is not large. We quote prices of brokers as follows to New York producers and dealers, per gross ton, New York:

Heavy melting steel.....	\$26.25 to \$27.75
Rerolling rails	32.80
Relaying rails	60.00 to 70.00
Iron and steel car axles.....	45.30
No. 1 railroad wrought.....	32.80
Wrought-iron track scrap.....	32.80
No. 1 yard wrought long.....	32.80
Light iron	9.00 to 10.00
Cast borings (clean).....	17.80 to 18.80
Machine-shop turnings.....	17.80 to 18.80
Mixed borings and turnings.....	14.50 to 15.50
Wrought-iron pipe (1 in. minimum diameter), not under 2 ft. long....	29.00 to 30.00

Dealers in New York and Brooklyn are quoting as follows to local foundries, per gross ton, but for delivery to cupola platforms of Brooklyn foundries about \$3 more is quoted:

No. 1 machinery cast.....	\$27.80 to \$28.50
No. 1 heavy cast (columns, building materials, etc.)	25.00 to 26.00
No. 2 cast (radiators, cast boilers, etc.)	24.00 to 25.00
Stove plate	23.00 to 24.00
Locomotive grate bars.....	23.00 to 24.00
Malleable cast (railroad).....	27.80 to 28.50
Old carwheels	27.80 to 28.50

Cast-Iron Pipe.—While considerable business of a private and public nature is in prospect, it is not expected that many orders will be placed in the near future. The cutting on Government prices in the case of competitive business is about \$2 per ton on 6-in. and \$1.50 on 4-in. The Government prices continue as follows: \$55.35, New York, for 6-in. and heavier, and \$58.35 for 4-in.; \$65.35 for 3-in. and \$1 additional for class A and gas pipe.

IRON AND INDUSTRIAL STOCKS

Unfavorable War News and Adverse Industrial Conditions Put Stop to Bullish Tendencies

The recent incipient bull market disappeared last week and values softened somewhat under the influence of news of the Tuscania torpedoing and announcement by THE IRON AGE that January pig-iron output was at lowest point in nearly three years, and that steel plants are operating on a 50 per cent basis. Most steel plant stocks accordingly sold at lower levels than the previous week. United States Steel, com., lost 1½ points; pref., 1; Bethlehem Steel, com., 2¼; class B, 1½; 8's pref., 2¼; Crucible Steel, pref., 1; Gulf States Steel, com., 2; Lackawanna Steel, com., 1¼; Midvale Steel, com., ¾; Republic Iron & Steel, com., 1½; Superior Steel, com., 1½; United Alloy Steel, com., ½.

Increases were recorded in the cases of Crucible Steel, com., 1½ points; Nova Scotia Steel & Coal, com., ¾; Republic Iron & Steel, pref., 1½; Sloss-Sheffield Steel & Iron, com., 2¾; Virginia Iron, Coal & Coke, com., 3½. Slight advances were also the rule with most of the large metal-working industrials.

The range of prices on active iron and industrial stocks from Tuesday of last week to Wednesday of this week was as follows:

Allis-Chalm. com.	22½-24½	Int. Har. Corp.	
Allis-Chalm. pf.	74½-76	com	70-70½
Am. Can com.	37½-40½	Lacka. Steel	76-77
Am. Can pf.	90½-91½	Lake Super. Corp.	13½-14½
Am. Car & Fdry		Midvale Steel	44-45½
com.	71½-74½	Nat.-Acme	31½
Am. Loco. com.	57½-61½	Nat. En. & Stm.	
Am. Loco. pf.	97-98½	com	43-45½
Am. Ship com.	87	N. Y. Air Brake	128½-132
Am. Steel Fdries.	60-63	Press. Steel com.	62-64½
Bald. Loco. com.	62½-68½	Ry. Std. Spr'g com.	51½-53½
Beth. Steel com.	77-78½	Republic com.	75-77½
Beth. Stl. Cl. B.	75-77½	Republic pf.	96-97½
Cent. Fdry. com.	33½	Sloss com.	42½-45½
Cent. Fdry. pf.	45½	Superior Steel	34½-35½
Chic. Pn. Tool.	49½-51	Transue-Wms.	40
Colo. Fuel	37½-38	Un. Alloy Steel	38½-39½
Cruc. Steel com.	55-59½	U. S. Pipe com.	15
Gen. Electric	134-136	U. S. Steel com.	92½-95½
Gt. No. Ore Cert.	27-27½	U. S. Steel pf.	109½-110½
Int. Har. of N. J.		Va. I. C. & Coke	55-60
com.	120-126½	Warwick	8½
Int. Har. of N. J.		Westing. Elec.	40½-41½
pf.	109½-109¾		

Dividends

The Atlantic Steel Co., extra, 15 per cent on the common, payable Feb. 15.

The Bethlehem Steel Co., class B, quarterly, 2½ per cent, on 1¼ per cent on the non-cumulative preferred and 2 per cent on the cumulative convertible preferred, all payable April 1.

The Chicago Railway Equipment Co., extra 5 per cent, and 20 per cent in stock, both payable Feb. 18.

The National Acme Co., quarterly, 75c., payable March 1.

The Niles-Bement-Pond Co., quarterly, 3 per cent on the common, payable March 20, and 1½ per cent on the preferred, payable Feb. 20.

The Pratt & Whitney Co., quarterly, 1¼ per cent on the preferred, payable Feb. 20.

The Studebaker Corporation, quarterly, 1 per cent on the common and 1¼ per cent on the preferred, payable March 1.

The Whitman & Barnes Mfg. Co., quarterly, 1½ per cent and extra 1 per cent, payable Feb. 15.

The American Smelting & Refining Co., quarterly, 1½ per cent on the common, payable March 15, and 1¼ per cent on the preferred, payable March 1.

American Locomotive Report

The semi-annual report of the business of the American Locomotive Co. for the six months ended Dec. 31, 1917, shows net profit for the six months ending Dec. 31, 1917, of \$6,010,009, before deduction of taxes, and including \$439,376 of profit on the munitions business, the remaining profit of \$5,570,633 having been made entirely from the regular locomotive business of the company. The net profit for the six months ending Dec. 31, 1916, of \$5,453,334, before tax deductions, included a profit on munitions work of \$3,663,520.

The locomotive output of the company for the six months ending Dec. 31, 1917, was practically all ob-

tained from the Schenectady, Brooks, Pittsburgh and Cooke plants, which collectively represent about 70 per cent of the company's locomotive capacity. The Richmond and Montreal plants of the company, which had been engaged exclusively on munitions work since 1915, finished their munitions contracts in July and August, 1917, and the work of restoring those plants for locomotive manufacture was completed during October, 1917.

The amount of money in inventories of materials and work in process on Dec. 31, 1917, was \$27,830,295. In the largest year of business prior to the war the amount of such inventories was about \$11,000,000. This very large increase of about \$16,800,000 is due to the higher cost of materials and labor and also to the rearrangement of our locomotive production schedules, to meet the war requirements of the Government, which resulted in postponing the construction of locomotives, the material for which had been delivered to our plants.

Condensed Income Account			
	Six Months to Dec. 31, 1917	Six Months to Dec. 31, 1916	Increase Decrease
Gross earnings	\$35,959,126	\$37,863,594	\$1,904,468
Manufacturing, maintenance, administrative expenses and depreciation	29,851,294	32,326,743	2,475,449
	\$6,107,832	\$5,536,851	\$570,981
Interest, etc., on bonds of consti- tuent companies, notes, etc.	97,823	83,517	14,306
Profit	\$6,010,009	\$5,453,334	\$556,675
Reserve for United States income and excess profit taxes and Cana- dian business profits tax	2,040,758	1,822,500	218,258
Profit available for dividend	\$3,969,251	\$3,630,834	\$338,417
Dividends on pre- ferred stock for six months	875,000	875,000	
Dividends on com- mon stock for six months	625,000	625,000	
Surplus profit	\$2,469,251	\$2,130,834	\$338,417

The company received from the United States Government on July 24, 1917, a contract for 150 locomotives to be used in France for the transportation of our troops and supplies. These locomotives were completed during the months of September and October, 1917.

Due to the unsettled conditions in Russia the management thought it wise to obtain an adjustment of the contract made in July, 1917, with the Russian Government for 250 locomotives, and with the aid of the United States Government an adjustment has recently been effected, which, in view of all conditions, is satisfactory to the company.

Midvale Steel Earnings

The Midvale Steel & Ordnance Co.'s net profit of \$71,264,560 before allowing for Federal taxes and depreciation in 1917 was more than double the return in the preceding year. The preliminary statement issued last week showed that the management set aside \$27,360,270 for the excess profits and war income taxes and then had a balance of \$40,650,542, a total \$5,630,000 greater than the year before. The reserve for depreciation was \$6,415,039, against \$3,560,277 in 1916, leaving \$34,235,503 available for dividends and the surplus account, an increase of \$2,000,000 over the result the 1916 year brought.

The earnings of the year, with deductions, are presented in this table:

	First Half	Second Half
Net earnings	\$34,825,875	\$36,438,687
Federal tax	14,521,618	13,038,652
Interest charges	1,630,977	1,622,771
Depreciation	3,559,097	2,855,942
Net profit	15,114,181	18,921,322

The dividend balance was equal to \$17.12 for each outstanding share of stock, compared with \$16.11 the year before. In the final quarter the earnings state-

ment made a different showing from other steel concerns in that income was larger than in any of the preceding quarters. The total of \$10,882,037 in the three months ended Dec. 31 was \$2,842,752 larger than in the third quarter and \$3,826,646 more than in the first quarter.

American Steel Foundries

American Steel Foundries report for year ended Dec. 31:

	1917	1916	Inc.	Dec.
Op. earn.	\$8,718,296	\$4,842,237	\$3,876,059	
Deprecia.	917,646	739,414	178,232	
Balance	7,800,650	4,102,823	3,697,827	
Other inc.	238,024	122,987	115,037	
Total inc.	8,038,674	4,225,810	3,812,864	
Reserve		*344,000		\$344,000
Int. chgs.	219,235	1506,835		287,600
War taxes	2,287,600		2,287,600	
Surplus†	5,531,839	3,374,975	2,156,864	

†Equal to \$32.13 a share on \$17,184,000 capital stock, against \$19.64 a share in 1916.

*Includes sinking funds.

•Reserve for retirement of debentures.

Donner Steel Co. Doubles Profits

A report just issued by William H. Donner, president Donner Steel Co., Buffalo, shows that the company in its second year of operation made net earnings more than double those of 1916 on both preferred and common stocks. The fiscal year ended Dec. 31, 1917. The Donner Steel Co. began business on Jan. 2, 1916. It was organized by William H. Donner, who was formerly president of the Cambria Steel Co. and the Pennsylvania Steel Co.

For last year the report shows total net earnings of \$2,631,705, against \$1,166,058 for the previous year, and a surplus after reserve of \$346,526 for Federal income tax and excess-profit taxes and the payment of \$383,750 in dividends of \$1,060,402, against \$547,463 in 1916, when there was no reserve for taxes and no dividends were paid.

Looking to the future, President Donner says: "After the termination of the war and normal business is resumed there will be an enormous demand for steel. It will take years to meet the world's requirements, and especially is this true as to rails, steel cars and ships."

Industrial Finances

Holders of the common stock of the Matthews Iron & Steel Co., Rome, Ga., are being given an opportunity to exchange their common stock for common stock of the Dayton Coal, Iron & Railway Co., Dayton, Tenn. It is optional with the stockholders whether they make the exchange or not. In case a majority of the stock is exchanged, the two companies will be placed under one management. A complete report on the resources of each company was published in THE IRON AGE of Feb. 7, page 414.

The Wheeling Steel & Iron Co., Wheeling, W. Va., has declared a stock dividend of 25 per cent, payable March 1.

The annual meeting of the Canada Iron Foundries, Ltd., was held in Montreal recently. This company is the successor of the Canada Iron Corporation, which went into liquidation about four years ago. An increase of 44 per cent in the year's sales was reported, which makes the total for the year ending Sept. 30 last about \$2,849,000, as compared with \$1,979,933 for the previous year, which considerably strengthens the company's position. Including \$14,160 earned as interest, discount, etc., the net revenue of the year was \$542,257.

The property of the Spring Steel Fence & Wire Co., Anderson, Ind., was sold at receiver's sale for \$17,000 to John Q. A. McClurg and W. H. Alford, Indianapolis, who were among the principal stockholders. The plant has been idle for more than a year.

The gross business of the Trumbull Steel Co. in 1917 was \$26,240,000, as compared with \$9,200,000 in the previous year. After paying the preferred dividends, regular 6 per cent on common and 7½ per cent extra,

allowing for estimated income and excess profit taxes, depreciations, upkeep and the like current requirements, the earnings available for the common stock were at the rate of \$83 a \$100 share. The book value of the common stock now is in excess of \$200 a share. The surplus at the opening of 1917 was about \$2,000,000.

The Hydraulic Pressed Steel Co., Cleveland, earned a net balance during 1917 of 35½ per cent on its \$4,900,000 common stock after a deduction of interest and preferred dividends, as compared with 20 per cent on \$4,250,000 in 1916. Its net earnings amounted approximately to \$2,810,000. It had unfilled orders to the amount of \$11,000,000 at the beginning of 1918, as compared with \$3,500,000 a year ago. It has large Government contracts.

WILL BROADEN ITS WORK

American Pig Iron Association Will Increase Its Membership

The annual meeting of the American Pig Iron Association was held in the William Penn Hotel, Pittsburgh, on Thursday, Feb. 7, and was very largely attended. J. G. Butler, Jr., of Youngstown, who has been president of this association since it was organized, presided and John A. Penton of Cleveland was secretary. A feeling has existed since practically the starting of the war that while the American Pig Iron Association had admirably met all the demands made on it prior to the starting of the war, it has a greater work to perform during the time of war in the aid it will be called upon to give to our own country and to our Allies as well. The entire mobilization of the merchant pig-iron industry seems to be absolutely imperative, and the belief has existed in certain quarters that perhaps the forming of a new organization of merchant pig-iron makers might best solve this problem. However, after a full discussion of the subject it was agreed at Pittsburgh that the American Pig Iron Association is best equipped to meet the situation rather than a new organization that might require much time before its activities would take care of the larger work the merchant pig-iron makers plan to do, to give the general committee of the American Iron and Steel Institute on Steel and Steel Products the information it will want from time to time in regard to costs of manufacturing pig iron and to serve the needs of the military establishment with the greatest economy in time and transportation.

It was decided that for the purposes of the war the association needs to broaden its work in the effort to meet the demands of the country in any way they may come up, and it was the unanimous opinion of the members that the complete co-operation of all the merchant pig-iron makers is the only way to meet the situation. It was therefore proposed that an effort be made to include in the membership of the American Pig Iron Association every maker of merchant pig iron in the country. Some of the smaller merchant furnace owners who may feel that an active membership is not necessary will be asked to become associate members, agreeing to furnish from time to time such information of a statistical nature as may be needed by the American Pig Iron Association in its larger work.

In order better to carry on the campaign for new and associate members, a committee of six merchant pig-iron makers was appointed, one from each of the six districts maintained by the parent organization, to visit the merchant pig-iron makers in their respective districts and urge them to join the association as soon as possible either as active or associate members.

This committee consists of D. T. Croxton, president Cleveland Furnace Co., Cleveland; Leonard Peckitt, president Empire Steel & Iron Co., Catasauqua, Pa.; T. W. Friend, secretary and treasurer Clinton Iron & Steel Co., Pittsburgh; Seymour Wheeler, Pickands, Brown & Co., Chicago; J. W. Porter, Alabama Co., Birmingham, and W. T. Shepard, Rogers, Brown & Co., Buffalo. This committee will act at once, and as soon

as its work has progressed far enough to warrant it, another meeting of the American Pig Iron Association will be called.

An election of officers of the association was held, and on his earnest request J. G. Butler, Jr., Youngstown, Ohio, was permitted to resign. The association, however, did not propose to lose his valuable services, and a new position was created, that of life chairman. Mr. Butler was unanimously elected to fill it and he accepted. C. D. Dyer, vice-president Shenango Furnace Co., Pittsburgh, who has been a member of the Sub-committee on Pig Iron, Iron Ore and Lake Transportation of the American Iron and Steel Institute since it was organized, and who has given it most valuable service, was elected president to succeed Mr. Butler. Capt. F. B. Richards of M. A. Hanna & Co., Cleveland, was re-elected treasurer and John A. Penton, also of Cleveland, was re-elected secretary.

On the afternoon of Thursday a general meeting of members of the American Pig Iron Association and merchant furnace owners who are not now affiliated with the organization was held at the William Penn Hotel, at which the plans for the further development of the work of the association were fully discussed. Close to 100 pig-iron makers were present. It is believed that most of these will soon be actively identified with the American Pig Iron Association, either as active or associate members.

Mediation Commission's Remedies for Labor Troubles

Elimination of profiteering, the eight-hour day, less inconsistency between "our democratic purposes in this war abroad and the conduct of some of those guiding industry at home, and the recognition of some form of collective relationship between capital and labor as a principle in a national labor policy," are the principal recommendations of President Wilson's Mediation Commission, which has just finished a survey of the labor unrest west of the Mississippi River, which the Government, considered most menacing to successful prosecution of the war.

In return for this, the Commission holds labor should "surrender all practices which tend to restrict maximum efficiency," when it is assured of sound conditions and effective means for just redress of grievances.

The Commission, headed by Secretary Wilson of the Department of Labor, went west principally to look into the copper strikes in the Arizona district and the I. W. W. activities in the lumber districts of the Pacific Northwest. It included in its investigation, however, the dispute in the California oil fields and other labor troubles.

Steel Scarcity Affects Car Service

The scarcity of steel has so seriously affected street car service in Philadelphia that workmen employed at the Frankford Arsenal, the shipyards and other plants doing important Government work have protested. The Philadelphia Rapid Transit Co. admits the inferiority of the service and has asked the authorities in Washington to give it priority so that supplies may be obtained. Three hundred street cars are idle in the company's barns because of the company's inability to obtain material to make repairs. The transit company in a statement says:

"We have placed orders for goods worth \$1,000,000, but we can get no deliveries. Wheels ordered from the Midvale Steel & Ordnance Co. more than a year ago have not been delivered, and there seems little chance that they will come in the near future."

With the object of again bringing neglected canal systems into use, a meeting was held in the Engineering Societies Building, New York, on Feb. 8, at which various organizations were represented. Out of the meeting the Anthracite Canals Committee was formed to get the interest of Congress, the Council of National Defense and Director General of Railroads McAdoo.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight rates from Pittsburgh on iron and steel articles, aside from wrought iron and steel pipe in carloads, per 100 lb., New York, 19.5c.; Philadelphia, 18.5c.; Boston, 21.5c.; Buffalo, 11.6c.; Cleveland, 13.5c.; Cincinnati, 18.5c.; Indianapolis, 20c.; Chicago, 21.5c.; St. Louis, 27c.; Kansas City, 47c.; minimum carload, 36,000 lb.; St. Paul, 40c.; minimum carload, 36,000 lb.; Denver, 79c.; minimum carload, 36,000 lb.; Omaha, 47c.; minimum carload, 36,000 lb.; New Orleans, 30.7c.; Birmingham, 46c.; Pacific Coast, 75c.; minimum carload, 80,000 lb. To the Pacific Coast the rate on steel bars and structural steel is 90c., minimum carload, 40,000 lb.; and 85c., minimum carload, 50,000 lb. On wrought iron and steel pipe the rate from Pittsburgh to Kansas City is 40c. per 100 lb., minimum carload 46,000 lb.; to Omaha, 40c., minimum carload 46,000 lb.; to St. Paul, 35.5c., minimum carload 46,000 lb.; Denver, 79c., minimum carload 46,000 lb. A 3 per cent transportation tax now applies.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, 1/4 in. thick and over, and zeos, structural sizes, 3c.

Wire Products

Wire nails, \$3.50 base per keg; galvanized, 1 in. and longer, including large-head barb roofing nails taking an advance over this price of \$2, and shorter than 1 in., \$2.50. Bright basic wire, \$3.35 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$3.25; galvanized wire, \$3.95; galvanized barb wire and fence staples, \$4.35; painted barb wire, \$3.65; polished fence staples, \$3.65; cement-coated nails, \$3.40 base; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 47 per cent off list for carload lots, 46 per cent for 1000-rod lots, and 45 per cent off for small lots, f.o.b. Pittsburgh.

Bolts, Nuts and Rivets

Large rivets \$4.65 base
7/16 in. x 6 in. smaller and shorter rivets, 45-10 per cent off list
Machine bolts h.p. nuts, 5/8 in. x 4 in.:
Smaller and shorter, rolled threads, 50-10-5 per cent off list
Cut threads 50-5 per cent off list
Larger and longer sizes 40-10 per cent off list
Machine bolts c.p.c. and t. nuts, 3/4 in. x 4 in.:
Smaller and shorter 40-10 per cent off list
Larger and longer 35-5 per cent off list
Carriage bolts, 3/4 in. x 5 in.:
Smaller and shorter, rolled threads, 50-5 per cent off list
Cut threads 40-10 per cent off list
Larger and longer sizes 40 per cent off list
Lag bolts 50-10 per cent off list
Flow bolts, Nos. 1, 2, 3 50 per cent off list
Hot pressed nuts, sq., blank 2.50c. per lb. off list
Hot pressed nuts, hex., blank 2.30c. per lb. off list
Hot pressed nuts, sq., tapped 2.30c. per lb. off list
Hot pressed nuts, hex., tapped 2.10c. per lb. off list
C.p.c. and t. sq. and hex. nuts, blank 2.25c. per lb. off list
C.p.c. and t. sq. and hex. nuts, tapped 2.00c. per lb. off list
Semi-finished hex nuts:
5/8 in. and larger 60-10-10 per cent off list
9/16 in. and smaller 70-5 per cent off list
Stove bolts 70-10 per cent off list
Stove bolts 2 1/2 per cent extra for bulk
Tire bolts 50-10-5 per cent off list
The above discounts are from present lists now in effect.
All prices carry standard extras.

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, \$57; chain rods, \$65; screw, rivet and bolt rods and other rods of that character, \$65. Prices on high carbon rods are irregular. They range from \$70 to \$80, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes, 9/16 in. x 4 1/2 in. and heavier, per 100 lb., \$3.90, in lots of 200 kegs of 200 lb. each, or more; track bolts, \$4.90. Boat spikes, \$5.25 per 100 lb., f.o.b. Pittsburgh.

Terne Plate

Effective Nov. 7 prices on all sizes of terne plates are as follows: 8-lb. coating, 200 lb., \$15 per package; 8-lb. coating, I. C., \$15.30; 12-lb. coating, I. C., \$16.75; 15-lb. coating, I. C., \$17.75; 20-lb. coating, I. C., \$19; 25-lb. coating, I. C., \$20; 30-lb. coating, I. C., \$21; 35-lb. coating, I. C., \$22; 40-lb. coating, I. C., \$23 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars at 2.90c. from mill, and 4.50c. to 5c. from warehouse in small lots for prompt shipment. Refined iron bars, 3.50c. in carload and larger lots, f.o.b. mill.

Wrought Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card, as announced Nov. 5 by the Government on steel pipe, those on iron pipe being the same as quoted for some time:

Steel				Iron			
Inches	Black	Galv.		Inches	Black	Galv.	
1/8, 1/4 and 3/8	44	17 1/2		1/8 and 1/4	23		+4
1/2	48	33 1/2		3/8	24		+3
3/4 to 3	51	37 1/2		1/2	28		10
				3/4 to 1 1/2	33		17
Lap Weld				Lap Weld			
2	44	31 1/2		1 1/4	18		3
2 1/2 to 6	47	34 1/2		1 1/2	25		11
7 to 12	44	30 1/2		2	26		12
13 and 14	34 1/2			2 1/2 to 6	28		15
15	32			7 to 12	25		12
Butt Weld, extra strong, plain ends				Butt Weld, extra strong, plain ends			
1/8, 1/4 and 3/8	40	22 1/2		1/8, 1/4 and 3/8	22		5
1/2	45	32 1/2		1/2	27		14
3/4 to 1 1/2	49	36 1/2		3/4 to 1 1/2	33		18
2 to 3	50	37 1/2					
Lap Weld, extra strong, plain ends				Lap Weld, extra strong, plain ends			
2	42	30 1/2		1 1/4	19		4
2 1/2 to 4	45	33 1/2		1 1/2	25		11
4 1/2 to 6	44	32 1/2		2	27		14
7 to 8	40	26 1/2		2 1/2 to 4	29		17
9 to 12	35	21 1/2		4 1/2 to 6	28		16
				7 to 8	20		8
				9 to 12	15		3

To the large jobbing trade an additional 5 per cent is allowed over the above discounts, which are subject to the usual variations in weight of 5 per cent. Prices for less than carloads are four (4) points lower basing (higher price) than the above discounts on black and 5 1/2 points on galvanized.

On butt and lap weld sizes of black iron pipe, discounts for less than carload lots to jobbers are seven (7) points lower (higher price) than carload lots, and on butt and lap weld galvanized iron pipe are nine (9) points lower (higher price).

Boiler Tubes

The following are the prices for carload lots, f.o.b. Pittsburgh, announced Nov. 13, as agreed upon by manufacturers and the Government:

Lap Welded Steel		Charcoal Iron	
3 1/2 to 4 1/2 in.	34	3 1/2 to 4 1/2 in.	12 1/2
2 1/2 to 3 1/4 in.	24	3 to 3 1/4 in.	5
2 1/4 in.	17 1/2	2 1/2 to 2 3/4 in.	7 1/2
1 3/4 to 2 in.	13	2 to 2 1/4 in.	22 1/2
		1 3/4 to 1 3/8 in.	35
Standard Commercial Seamless—Cold Drawn or Hot Rolled			
Per Net Ton		Per Net Ton	
1 in.	\$340	1 1/2 in.	\$220
1 1/4 in.	280	2 to 2 1/2 in.	190
1 3/8 in.	270	2 1/2 to 3 1/4 in.	180
1 1/2 in.	220	4 in.	200
		4 1/2 to 5 in.	220

These prices do not apply to special specifications for locomotive tubes nor to special specifications for tubes for the Navy Department, which will be subject to special negotiation.

Sheets

Makers' price for mill shipments on sheets of United States standard gage in carload and larger lots, are as follows, 30 days net or 2 per cent discount in 10 days:

Blue Annealed—Bessemer		Cents per lb.	
No. 8 and heavier	4.20		
Nos. 9 and 10	4.25		
Nos. 11 and 12	4.30		
Nos. 13 and 14	4.35		
Nos. 15 and 16	4.45		
Box Annealed, One Pass Cold Rolled—Bessemer		Cents per lb.	
Nos. 17 to 21	4.80		
Nos. 22 and 24	4.85		
Nos. 25 and 26	4.90		
No. 27	4.95		
No. 28	5.00		
No. 29	5.10		
No. 30	5.20		
Galvanized Black Sheet Gage—Bessemer		Cents per lb.	
Nos. 10 and 11	5.25		
Nos. 12 and 14	5.35		
Nos. 15 and 16	5.50		
Nos. 17 to 21	5.65		
Nos. 22 and 24	5.80		
Nos. 25 and 26	5.95		
No. 27	6.10		
No. 28	6.25		
No. 29	6.50		
No. 30	6.75		
Tin-Mill Black Plate—Bessemer		Cents per lb.	
Nos. 15 and 16	4.80		
Nos. 17 to 21	4.85		
Nos. 22 to 24	4.90		
Nos. 25 and 27	4.95		
No. 28	5.00		
No. 29	5.05		
No. 30	5.05		
Nos. 30 1/2 and 31	5.10		

Metal Markets

The Week's Prices

	Cents Per Pound For Early Delivery						
	Copper, New York Lake	Electro-lytic	Tin, New York	Lead, New York	St. Louis	Spelter, New York	St. Louis
Feb. 6.....	23.50	23.50	85.00*	7.00	6.85	8.00	7.75
7.....	23.50	23.50	85.00*	7.00	6.85	8.00	7.75
8.....	23.50	23.50	85.00*	7.00	6.85	8.00	7.75
9.....	23.50	23.50	85.00*	7.00	6.85	8.00	7.75

*Nominal.

NEW YORK, Feb. 13.

Two holidays this week have interfered decidedly with the markets. Monday was another fuelless day and yesterday was Lincoln's birthday. The copper market continues nominal with no developments of any interesting nature. Tin has been quiet with spot metal unobtainable. Lead is without feature and unchanged. Spelter is inactive but firm. Antimony is lower and very quiet.

New York

Copper.—The fear which hung over the market last week as to future supplies of raw materials because of severe weather and railroad congestion has been largely dispelled, due to the milder weather of the last few days. With a holiday yesterday and another on Monday market news is entirely absent, especially in a commodity which is regulated as to price and distribution by strict Government rules. The official prices, 23.50c. and 24.67½c., still obtain, of course, and there has been no indication yet to cut these, despite rumors that some jobbers had done so. The Anaconda output in January was 24,984,000 lb., the largest since May, 1917. The July, August and September production averaged only 13,000,000 lb. per month.

Tin.—There have been but four market days in the last market week—the last four days of last week. During these days the market was quiet. A little business was done in far futures, but it was not large; in the aggregate it probably amounted to 400 tons. More business would have been done if there had been more sellers. Transportation difficulties, while a little better, are still interfering with shipments of tin. There has been no further commandeering. Spot tin is unobtainable, but is regarded as nominal at 85c., New York. Arrivals to Feb. 8, inclusive, have been 250 tons, with 5275 tons estimated as afloat. The London market on Feb. 8, the last cable, was £308 per ton for spot Straits, an advance of £7 over the quotation Feb. 5.

Lead.—Early to-day the American Smelting & Refining Co. advanced its price ¼c. per lb. to 7c., New York, but no reasons are yet known. As heretofore, the outside market will probably advance in sympathy. During the four days of market operations in the last week the situation has been quiet. There has been a little better inquiry, but this statement is purely relative. Buying has not been brisk, but the market was stagnant before. Some business was done, but it was not large in volume and was usually for nearby delivery. Up to the end of the week the quotations were unchanged at 7c., New York, or 6.85c., St. Louis, in the outside market.

Spelter.—The expected announcement regarding a fixed price on Grade A spelter has not yet appeared, and in the meantime the Government is taking regular quantities of the material at prices to be fixed later. It is more than eight months since this matter first came up. The market continues dull and lifeless at the unchanged quotations of 7.75c., St. Louis, or 8c., New York, for prime Western for early delivery.

Antimony.—There continues to be no activity and the market has sagged to 13.75c. to 14c., New York, duty paid, for Chinese and Japanese grades for prompt and early delivery.

Aluminum.—No. 1 virgin metal, 98 to 99 per cent pure, continues inactive and unchanged at 36c. to 38c., New York, for prompt and early delivery.

Old Metals.—The market is quiet. Dealers' selling prices are nominally as follows:

	Cents per lb.
Copper, heavy and crucible (nominal).....	23.50
Copper, heavy and wire (nominal).....	23.50
Copper, light and bottoms.....	21.00 to 21.50
Brass, heavy.....	17.00 to 17.25
Brass, light.....	12.25 to 12.50
Heavy machine composition.....	24.00 to 24.25
No. 1 yellow rod brass turnings.....	13.00 to 14.00
No. 1 red brass or composition turnings.....	19.00 to 20.00
Lead, heavy.....	6.50
Lead, tea.....	5.25
Zinc.....	6.00

Chicago

FEB. 11.—There is a great cry for copper, but the noise made by a few in distress exaggerates the actual shortage. It is believed that a few hundred tons would satisfy urgent demand. No Straits tin is available here. Lead was active last week, at prices that mounted to 7c., but it is now easier. Spelter and antimony continue quiet. We quote: Copper in carloads, 23.50c.; part carloads, 24.67½c.; tin, 85c. to 90c.; lead, 6.75c. to 6.85c.; spelter, 7.75c.; antimony, 16.50c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 21c.; copper clips, 20c.; copper bottoms, 19c.; red brass, 20c.; yellow brass, 14.50c.; lead pipe, 5.50c.; zinc, 5.25c.; pewter, No. 1, 42.50c.; tin foil, 50c. and block tin 57.50c.

Cleveland War Industries Are Organized

The Cleveland War Industries Commission, Cleveland, recently formed to organize the industries of Cleveland with a view of bringing them together into a single unit which can deal effectively with the Government, and to the mutual advantage of the Government and the various industries, has completed its organization. It has an executive committee consisting of seven members of which J. H. Foster, president of the Hydraulic Pressed Steel Co., is chairman. Other members of this committee include C. A. Otis, president of the Cleveland Chamber of Commerce; A. W. Henn, secretary and treasurer of the National Acme Co.; J. H. Herron, metallurgist, president of the Cleveland Engineering Society; T. S. Grasselli, president of the Grasselli Chemical Co. and E. E. Allyne, president of the Aluminum Castings Co. The commission has created six main divisions, Mr. Allyne being chairman of the castings division; Mr. Henn, chairman of that on machinery and machine products; Mr. Foster, chairman of the forgings and stamping division, and Mr. Herron, chairman of the engineering division.

The castings division has been sub-divided with D. J. Ryan of the Allyne-Ryan Foundry Co. as chairman on gray iron castings; F. M. Wyss of the Aluminum Castings Co., chairman on aluminum and brass castings; C. W. Hotchkiss of the National Malleable Castings Co., chairman on malleable iron castings, and J. J. Bever of the Otis Steel Co., chairman on steel castings. J. R. Blakesley of the Ajax Mfg. Co. is chairman of the sub-division on machinery; E. C. Reader of the Steel Products Co., chairman on machine tool products; W. R. Mitchell, National Acme Co., chairman of bar metal products; D. K. Swartwout of the Ohio Blower Co., chairman of specialties, and H. L. Martien of the Martien Electric Co., chairman of electrical appliances.

That the condition of order books of the steel mills on Jan. 1 was no better than that of a year ago is the contention of the head of a steel plant of prominence. The average bookings for the first six months of 1917 were 95 per cent of theoretical capacity, while the bookings over the last half year averaged about 82 per cent, but shipments were so materially reduced that the company started 1918 with fully three months work ahead, as it did in January, 1917. Specifications on contracts varied of course from time to time but on the whole were about 5 per cent below bookings. The booking figures were as follows: January, 90 per cent; February, 86; March, 103; April, 92; May, 95; June, 103; July, 81; August, 76; September, 86; October, 83; November, 87; December, 81. New bookings in January, 1918, amounted to 76 per cent of theoretical capacity.

HIGH COST OF SHUTDOWNS

Saving in Coal Results in Heavy Loss of Wages and Production

WASHINGTON, Feb. 12.—The rescinding of the heatless Monday order before the end of the present week is now confidently counted upon and, barring unforeseen developments, no further industrial shutdowns will be decreed during the remainder of the winter. Fuel Administrator Garfield has already canceled the Monday holiday in the Southern States in view of milder weather conditions, which have recently spread to the North and East, and the improvement in the general transportation situation promises the lifting at no distant date of the freight embargo imposed by the Director-General of Railroads on all traffic except food, fuel, and war material.

Coal Saving at \$32 Per Ton

Figures have recently been compiled for the Director-General of Railroads which make it possible to appraise with a fair degree of accuracy the cost to the country of the Garfield order forcing industrial shutdowns. Detailed statistics prepared for an official report by W. P. Manss, industrial agent of the Baltimore & Ohio Railroad, a recognized expert, show that during the five-day shutdown, with which the heatless holidays were inaugurated, a saving of coal was made amounting in value to \$137,377,589 in 18 leading manufacturing cities of the Union, but at a cost in wages lost of \$1,221,415,000 and \$3,122,655,000 in lost production. Thus, for every dollar's worth of coal saved by the shutdown the workers of the country sacrificed \$9 and the manufacturers \$23. Director-General of Railroads McAdoo, who received these figures on Feb. 5, just before his conference with Dr. Garfield, at which it was decided to continue the heatless Monday order, is said to have been greatly impressed with the showing made and to have yielded very reluctantly to the Fuel Administrator's arguments in favor of an extension of the shutdown.

Interesting Details

Details of the statement prepared by Mr. Manss are exceedingly interesting. New York heads the list, with a fuel saving estimated at \$31,500,395, but with a wage loss of \$357,498,000, and a loss in product of \$1,063,667,000. Chicago stands second with a fuel saving valued at \$27,486,908, but a wage loss of \$213,757,000 and a loss in manufactures of \$381,535,000. It will be noted that a comparison of the statistics for these two cities shows a much larger proportionate loss in wages and in product as compared with fuel saved in New York than in Chicago. The following table gives the details of the 18 cities referred to:

City	Fuel Saved	Wages Lost	Manufactures Lost
New York	\$31,500,395	\$357,498,000	\$1,063,667,000
Chicago	27,486,908	213,757,000	381,535,000
Philadelphia	14,378,757	138,249,000	333,303,000
Detroit	5,446,475	69,447,000	178,099,000
Cleveland	10,903,284	67,351,000	153,925,000
Boston	3,845,540	49,444,000	134,234,000
Buffalo	6,824,615	34,818,000	89,520,000
Pittsburgh	10,470,576	45,066,000	96,779,000
Milwaukee	5,349,465	36,270,000	98,679,000
Baltimore	3,135,391	35,509,000	94,639,000
Cincinnati	2,198,284	33,159,000	96,753,000
Newark	3,424,436	36,647,000	97,163,000
Minneapolis	2,430,957	18,895,000	56,655,000
Jersey City	2,928,492	17,657,000	52,746,000
Perth Amboy	1,353,245	4,996,000	13,215,000
Rochester	1,569,614	26,600,000	82,167,000
Indianapolis	2,765,979	19,042,000	43,636,000
Akron	1,273,176	17,310,000	56,230,000
Total	\$137,377,589	\$1,221,415,000	\$3,122,655,000

In explanation of the relatively small fuel saving and loss in wages and in product credited to Pittsburgh, it is said that because of the exemptions granted in the Pittsburgh district to cover war material the shutdown was not nearly so extensive as the industrial importance of the city would indicate.

Steel Producers' Loss

Mr. Manss also submitted to Director-General McAdoo a supplemental table showing by industries some

fuel savings and the combined losses in wages and product. According to these statistics iron and steel producers, including furnaces, steel works and rolling mills, saved about \$55,000,000 in fuel and lost \$500,000,000 in wages and products. Foundries and machine shops saved only \$20,000,000 in fuel and lost \$750,000,000. Automobile manufacturers saved \$5,000,000 and lost \$375,000,000. Railroad car and locomotive works, the output of which has been so acutely needed during the past 90 days, saved but \$12,000,000 and lost \$500,000,000. The lumber industry saved \$4,000,000 in various kinds of fuel, chiefly their own waste products, and lost in wages and manufactured lumber \$65,000,000. The cotton manufacturing industry saved \$17,000,000 and lost about \$400,000,000, while the producers of boots and shoes saved \$2,000,000 and lost \$300,000,000.

Whether the ratios upon which Mr. Manss' report is based with respect to the five-day shutdown would apply to heatless Mondays can only be conjectured. Experts who have followed this extraordinary affair from the beginning suggest that the loss in product and in wages has been greater proportionately on the cold Mondays than during the five-day period for the reason that the supervision of the industries of the country by the Fuel Administration has recently been much more rigid than it was during the initial shutdown. As the five-day period included a Sunday, when industrial operations would have been at a standstill without the Garfield order, it appears that the loss in wages and product averaged in the 18 cities referred to considerably more than a billion dollars a day, a figure that it is believed fairly represents the loss on the subsequent heatless Mondays.

First Keel Laid at Hog Island

The first keel of the fleet of 120 vessels to be built by the American International Shipbuilding Corporation at Hog Island, near Philadelphia, was laid on Tuesday of this week, according to a statement made in Washington by George J. Baldwin, vice-president of the corporation. Forty-nine keels will be laid during February and March, he said. Rear Admiral Bowles of the Emergency Fleet Corporation is now in full charge of the shipyard, in addition to those of the Submarine Boat Corporation, at Newark, N. J., the Chester Shipbuilding Co., Chester, Pa., and the Merchant Shipbuilding Corporation at Bristol, Pa., all of which are to build or are building fabricated ships. Admiral Bowles has weeded out some of the high salaried positions, which were the subject of criticism by the Senate investigating committee. The publicity department has been dispensed with and all announcements concerning work at the American International yard will henceforth come from Admiral Bowles himself.

The housing plan for shipyard workers in Philadelphia has been finally decided upon and the representatives of the city are waiting for action by the Government authorities. The plan provides for the construction of a model town, consisting of 3500 houses, in the fortieth ward, which is that section of the city lying closest to the Hog Island yard. The site for the town consists of 225 acres. The lowest bid for the construction of the town was \$136,795.

New By-Product Ovens Soon in Operation

The new by-product coke plant of the Colorado Fuel & Iron Co., Pueblo, Colo., will be ready for operation soon. Except for the plant of the Laclede Gas Co. in St. Louis it is the only by-product plant west of the Mississippi River. The H. Koppers Co., Pittsburgh, is building the plant, which has 120 ovens. Provision has been made for the construction of two additional batteries if they shall be needed.

Housing for women in war work has been investigated by a committee of the Young Women's Christian Association and a pamphlet report covering what was submitted to the Secretary of War has been published. A copy may possibly be obtained by addressing the Housing Committee at 600 Lexington Avenue, New York.

PERSONAL

W. S. Pilling of Pilling & Crane, Philadelphia, has gone to Florida for a few weeks' rest.

G. F. Evans has been appointed supervising engineer of the National X-Ray Reflector Co., Chicago, in the territory comprising Ohio, except Toledo and Cincinnati, West Virginia and western Pennsylvania. Mr. Evans is located at 825-826 Columbus Savings and Trust Bldg., Columbus, Ohio. He was formerly connected with the W. C. Moore Co., Columbus, Ohio.

David P. Ballard, for a number of years purchasing agent of the Wellman-Seaver-Morgan Co., Cleveland, has joined the forces of the National Acme Mfg. Co. of that city.

Eliot A. Kebler, secretary and treasurer Matthew Addy Co., Cincinnati, has resigned to take the position of president and secretary of the Fawcus Machine Co., Pittsburgh, succeeding the late Thomas Fawcus. Mr. Kebler is a graduate of the University of Cincinnati, was chemist for the Cincinnati Pipe Co. and afterward for the Addystone Pipe & Steel Co. and was later secretary of that company. When the Addystone company was merged with the United States Cast Iron Pipe & Foundry Co., he became connected with the firm of Matthew Addy & Co. and remained with that firm up to the present time with the exception of three years when he was resident manager of M. A. Hanna & Co., at Pittsburgh. He was one of the original incorporators of the Fawcus Machine Co., and its first secretary and treasurer. He is a member of the American Iron and Steel Institute and is well known in iron and steel circles. The following are the remaining officers of the Fawcus Machine Co., all of whom have been connected with the company a number of years: Vice-president, George E. Shaw, of Smith, Shaw Reed & Beal; general manager, A. F. Cooke, who was formerly sales manager; treasurer, T. J. Haley, formerly acting secretary; sales manager, W. C. Bates, re-elected; works manager, H. B. Newell, formerly superintendent, and purchasing agent, F. W. Bertler.

William G. Sullivan has been elected assistant treasurer of the Standard Process Steel Corporation, Phillipsburg, N. J.

William G. Hammerstrom, chief engineer of the Lynchburg Foundry Co. has been promoted to the position of general superintendent and will be located at Lynchburg, Va. He will continue in general charge of all engineering matters for the three plants of the company, the other two being at Radford, Va., and Anniston, Ala.

J. W. Lauren, formerly vice-president of the Reynolds Wire Co., Dixon, Ill., and L. H. Bergman, until recently fuel engineer for the Midvale Steel Co., Philadelphia, have incorporated the American Industrial Engineering Co., with offices in the Monadnock Bldg., Chicago, and will specialize on wire mill equipment, pulverized fuel installations, furnace work and fuel economy.

L. H. Swind, president Swind Machinery Co., Philadelphia, announces his resignation as a member of the board of directors of the Fort Mifflin Shipbuilding Co., Philadelphia.

M. J. Somers, formerly assistant superintendent of foundry of the American Seeding Machine Co., Springfield, Ohio, has been made superintendent of foundry at the new plant of the Fulflo Pump Co., Blanchester, Ohio.

At the annual stockholders' meeting of the Whitman & Barnes Mfg. Co., Akron, Ohio, A. D. Armitage was elected president succeeding C. E. Sheldon, who is now chairman of the board of directors. The other officers elected are: W. H. Eager and A. B. Hall, vice-

presidents; W. E. Rowell, secretary; S. H. Tuttle, assistant secretary; and other directors are, Frank A. Seiberling, George R. Hill, C. B. Raymond and A. H. Commins. Mr. Seiberling succeeds A. B. Rinehart, who has resigned. E. A. Fisher, assistant treasurer, has been elected treasurer. Last September, Mr. Sheldon celebrated 50 years and Mr. Armitage 25 years in continuous service of the company.

B. I. Spock, general solicitor of the New York, New Haven and Hartford Railroad, has resigned to become general counsel with the Chase Metal Works, Chase Rolling Mills and the Waterbury Mfg. Co., of Waterbury, Conn.

Geo. P. Huftman has been appointed manager of the forge department of the Davis Sewing Machine Co., Dayton, Ohio.

A. W. Towse, who has had wide engineering experience in Latin America, has been appointed general manager for Wm. Jessop & Sons, Inc., and has lately arrived from England to take up this position at 91 John Street, New York.

P. J. Phillips, who has been in charge of the Spanish-American sales for the steel department of the Federal Export Corporation, left Feb. 8 for an extended trip through the West Indies, Central America and the countries of Northern South America.

C. C. Jett, who has been connected with the engineering offices of Julian Kennedy, Pittsburgh, has been appointed chief draftsman of the Donner Steel Co., Buffalo.

Charles Vought, who recently returned from a trip to France in the interest of the American Steel Export Co., Woolworth Building, New York, is about to return to France.

H. N. Trimble, president of the H. N. Trimble Steel Co., Pittsburgh dealer in iron and steel scrap of all kinds, has been elected a member of the New York Stock Exchange.

C. A. Barnes, Widener Building, Philadelphia, has resigned from the secretaryship of the Eastern division of the American Board of Scrap Dealers, but will continue as secretary of the national organization. He will devote a considerable part of his time to the duties of secretary of the new Sub-Committee on Iron and Steel Scrap of the American Iron and Steel Institute. J. V. S. Bishop, Real Estate Trust Building, Philadelphia, succeeds him as secretary of the Eastern division.

At the annual meeting of the Hydraulic Pressed Steel Co., Cleveland, held last week, H. B. Bole, who had been general manager, was made first vice-president, and was succeeded as general manager by George C. Brainard, who has been factory manager. The latter was succeeded by J. D. Corcoran. H. F. Pettie became secretary, succeeding Major Ben P. Bole. At the annual meeting of the stock holders, C. A. Irwin was added to the board of directors. Mr. Irwin was formerly president of the Canton Sheet Steel Co., which was recently taken over by the Hydraulic company.

S. A. Carson has sold his holdings in the Southern Connellsville Coke Co., Uniontown, Pa., and has resigned as director and general manager, intending to devote himself to other interests.

C. M. Talhelm is temporarily representing the Landis Tool Co., Waynesboro, Pa., in the New York territory. He was until recently located in Detroit for the same company.

R. F. Williams and George P. Thomas have formed the Williams & Thomas Machinery Co., which will handle a complete line of machine tools, railroad and shipyard equipment, with offices in the Commercial Trust Building, Philadelphia. Mr. Williams, president of the new company, was for seven years with Manning, Maxwell & Moore, Inc., Philadelphia, and more recently with the Sherritt & Stoer Co., same city, while Mr. Thomas, secretary-treasurer, is also president of the Thomas Spacing Machine Co., Pittsburgh.

OBITUARY

HENRY H. HODELL, a prominent Cleveland manufacturer, died Feb. 10, age 68 years. He was president of the Cleveland Galvanizing Works Co., which he established 30 years ago, and one of the founders and president of the Van Dorn & Dutton Co., and a director in the Van Dorn Electric Tool Co. He leaves two sons, F. G. Hodell and Howard H. Hodell, general manager and superintendent respectively of the Cleveland Galvanizing Works Co.

CHARLES A. BORST, who was at the head of the Clinton Hematite Mines, Clinton, N. Y., died suddenly Jan. 28 in his 67th year. About 15 years ago, he undertook the development of the iron mines at Clinton, N. Y., and the use of the Clinton hematites by a number of Pennsylvania and New York blast furnaces was due to his efforts. For a number of years, Mr. Borst was an instructor in astronomy at Hamilton College, Clinton, N. Y.

GEORGE J. EMENY, for many years president of the G. J. Emeny Machine Works, Fulton, N. Y., died Jan. 25, aged 79 years.

A Large Steel Foundry at Hongkong, China

The demand for small steel castings of all kinds from railroad contractors, engineering and dock companies and from small manufacturers is growing to such an extent in China, that a proposition is on foot to increase the capital of the Hongkong Steel Foundry Co., Ltd., Hongkong, China, to \$1,000,000. A prospectus has been issued in which it is stated that it is believed this large demand can be supplied at home instead of by costly importations if the foundry's present small equipment is increased. A campaign is on to achieve this.

British Ferromanganese and Tin Plate for Spain

An agreement between Spain and Great Britain has been entered into regarding reciprocal supplies. Part of it relates to the furnishing by Great Britain to Spain of ferromanganese and tin plate. The Spanish Ministerio del Estado has transmitted all applications relating to such materials to the General Commissariat of Supplies, in order to enable this body to settle claims as to priority, etc. This body is to deal in future with all supplies of ferromanganese from Great Britain and tin plate from Great Britain or the United States.

Buoyancy boxes, so-called, for rendering a ship unsinkable, have been applied to a steamship in the service of the Government. They are the devising of William T. Donnelly, consulting engineer, New York. The particular ship, the Lucia, has about 9000 or 10,000 boxes. They are of ordinary pine, 3 ft. high, 2 ft. thick and 1 ft. deep. To secure water and air-tightness they are covered with galvanized sheets. The boxes are fitted in lines around the ship, both above and below the waterline, and fastened to beams where vacant space is available. Boxes of larger size are used where suitable. Mr. Donnelly estimates that only 14 per cent of the cargo space is lost in making the ship invulnerable. The cost of thus equipping vessels is put at 10 per cent of the cost of the ship.

The Steel Co. of Canada, Hamilton, Ont., announces an interesting development in the company's affairs in the starting up of the new sheet mill at its Hamilton works. This plant was moved from Morrisburg, Ont., having been purchased by the Steel company. It is practically new and can roll black sheets ranging from 14 to 30 gage. This is the only sheet mill at present in operation in Canada.

Broaden Control of Material for Export

WASHINGTON, Feb. 13. (By Wire).—The War Industries Board is sending out warnings to manufacturers making goods for export not to attempt shipments either by rail or water until export licenses for the goods in question have been actually issued by the War Trade Board. It is intimated in these warnings that manufacturers will incur a serious risk if they even manufacture goods in advance of the granting of licenses. The purpose of the War Industries Board is to put an end to practices said to have been indulged in recently by jobbers and brokers, who have purchased for export goods not fairly classifiable as war material and after having brought their purchases to the seaboard have sought to prevail upon the War Trade Board to grant export licenses on the ground that the goods were occupying valuable storage space at terminals and ought to be moved out of the country as speedily as possible. Hereafter parties moving to tidewater goods for which no export licenses have been issued will find themselves unable to ship them out of the country. It is announced by the War Trade Board that rolling mill, blast furnace and steel furnace products have been placed on the conservation list and will require licenses from the bureau of exports for exportation to any country of the world unless the shipment is covered by ocean or through railroad bill of lading dated on or before Feb. 11.

British Steel Output Now 12,000,000 Tons Yearly

A remarkable expansion in the steel output of Great Britain has been an outstanding feature of the war. The production has grown so that now it is 50 per cent greater than it was before the war started. The following comment from the *London Iron and Coal Trades Review* explains this unusual growth:

The work of extending existing plants and of putting down steel works has proceeded very satisfactorily during 1917, notwithstanding the obvious difficulties occasioned by the state of war. Several entirely new undertakings are now in active, though not yet in the fullest, operation, and a number of others will be ready early this year. The output of acid and basic steel (excluding steel castings and crucible steel) in the United Kingdom in 1914 was not more than about 7,800,000 tons. In 1916, including steel castings, it had been brought up to about 9,200,000 tons. During the year just ended, taking account of the extensions in hand, it has been increased to 10,500,000, or 11,000,000 tons. This is a remarkable achievement, but when all the new plants are completed the annual production should not be less than about 12,000,000 tons. Government control during 1917 has not only been maintained but intensified, for practically the whole production has been required, directly and indirectly, for purposes of the war. Hence commercial work has been entirely neglected. It is a matter of profound congratulation that in a period of deep and widespread industrial unrest the good relationship between employers and employed in the steel trade has been undisturbed by any serious dispute. All engaged in the industry have worked with felicitous harmony and good will, anxious only to forward the great cause in which they are privileged to play so important and, indeed, vital a part. Prices remained unaltered throughout the year until November, when some advances were sanctioned.

The Pittsburgh Wood Preserving Co., the Ohio Wood Preserving Co., Michigan Wood Preserving Co. and the Acme Tie Co. have moved their general offices to the Century Building, Pittsburgh.

Failure of Steel Ship Plans Predicted

Fabricated Vessel Cannot Be Built as Proposed, Says Vice-President Powell—Great Importance of Educating Workingmen Is Urged

WASHINGTON, Feb. 12.—That the project for building fabricated steel ships at the three great Government-owned yards now being laid out at a probable cost of \$70,000,000 for the construction of a billion dollars' worth of vessels will prove a serious disappointment to the builders and to the United States Shipping Board and will have to be abandoned in large part and return made to "old fashioned" shipbuilding methods is the disquieting statement made to the Senate Committee on Commerce during the past week by no less an authority than Joseph W. Powell, vice-president of the Bethlehem Shipbuilding Corporation. Mr. Powell emphasizes his statement by the declaration that it is concurred in by practically every experienced builder of steel ships with whom he has discussed the subject. The fabricated ship idea, Mr. Powell told the committee, is not a novelty, but has been thoroughly tested by practical shipbuilders who have demonstrated that it is not practicable to carry the fabricating principle beyond a certain amidships section and he predicted that the builders at the three Government yards would ultimately reach this conclusion, but only after a delay more serious to the shipbuilding program than the increased cost involved.

An Alarming Crisis

Of equal importance with reference to the completion of the gigantic shipbuilding program of the Emergency Fleet Corporation is the declaration made by Mr. Powell that because of the reduced efficiency of labor and the restrictions imposed on output by labor organizations and the work of "certain forces that are not steering labor in the right direction" an alarming crisis has been reached, and that "whether it is handled well or badly is going to be the thing that settles the future of the United States."

Incidentally Mr. Powell criticises sharply the cost-plus-profit form of contract and suggests a modification thereof which, while fully protecting the Government, still affords an important incentive to the contractor to produce his best work at a minimum cost. In this connection Mr. Powell said that the impression that the shipbuilders of the country were making large profits was wholly erroneous. Since the United States became involved in the war the Government had commandeered all vessels under construction and had forbidden shipyards to take new business, thus preventing shipbuilders from making the profits with which to pay for enormous increases in equipment. Following this Congress had enacted revenue laws, including the war excess profits tax, under which all gains above a modest living return were covered into the Treasury. Shipbuilders as a class, he said, took a philosophical view of the matter and were not disposed to complain, regarding their lost opportunities as patriotic sacrifices.

Makes Deep Impression

No statement made to the Senate Committee since the pending investigation began has produced so deep an impression upon its members as Mr. Powell's specific declaration with regard to the failure of the fabricated steel ship idea to realize the expectations of its projectors. After describing his experience as a naval constructor prior to 1906 and his work with the Cramp Shipbuilding Co. and the Fore River Shipbuilding Corporation, Mr. Powell was asked if he had ever built a "fabricated" ship, to which he replied that he had

never constructed such a vessel as was contemplated under the plans of the Government-owned shipyards. The idea, however, he said, was not new, but was conceived prior to 1899 by Mr. Morse, who designed the New York Shipbuilding Co.'s plant at Camden, N. J., with the purpose of constructing ships according to this plan.

"Mr. Morse built this shipyard," continued Mr. Powell, "and he fabricated his first two ships according to this carefully studied plan, and after he had fabricated them he tore down half of them and threw them away, and he built the remainder of those two ships just as the shipbuilders had always been doing. But Mr. Morse did a great work, because he proved that a greater proportion of the ship could be fabricated than anyone had believed up to that time, and to-day every shipyard in this country is using the same system that Mr. Morse developed. He tried to do the whole thing in accordance with his original plans and found he could not, but he did demonstrate how far a ship could be fabricated."

Limited Fabrication

"What do you think of the fabricated ship?" asked Senator Calder.

"I think the gentlemen who are attacking that job," replied Mr. Powell, "are going to find out just what Mr. Morse found, that they can fabricate a certain part of the ship, but can not fabricate the rest. They will then build the remainder of the ship just like the rest of us do."

"When are they going to find that out?" asked Senator Calder.

"When they put up their first ships," replied Mr. Powell.

"Evidently you do not think very much of the scheme," commented Senator Calder.

"I do not," replied Mr. Powell, with emphasis. "I think there has been enough learned in shipbuilding all over the world so that nobody can step into this business and discover some wonderful way of increasing the ease and facility of construction."

"Do you think our whole program of fabricated ships is going to fall down?" asked Senator Johnson.

"Not at all," replied the witness, "but I think it is going to slow up. I think when they start putting those ships together they are going to find that the parts will not go together."

"Does that mean beginning all over again?"

"No; that means building the ends of the ships according to the present methods. Practically what we do now is to start amidships of the vessel and use the so-called fabricated principle for a considerable part of the length toward both ends, but then you have to go back to the old shipbuilding system."

"Are you aware," asked Senator Johnson, "that the major part of the contracts for our ships are for fabricated vessels; that the contracts at Hog Island and at the plants of the Submarine Boat Co. and of the Merchant Shipbuilding Corporation and the Chester Shipbuilding Co. are all for fabricated ships and that they constitute the major part of the ships that are contracted for?"

"I think," replied the witness, "that those gentlemen are going to learn a good deal more as they live a little longer."

"You think the work will be delayed some months?"

"It is my judgment that the completion of those ships will be delayed while they are finding out what they can do and what they cannot do."

"And it will result in a great financial loss?"

"I do not believe it will necessarily result in a very great financial loss. I think the question of delay is much more important."

"I agree with you," responded Senator Johnson; "the question of delay is much more important."

So keen was the interest shown in Mr. Powell's statement that he was closely cross-examined by Senator Johnson not only with respect to the general consensus of opinion among shipbuilders regarding the fabricating plans but also as to the character of the shipbuilding talent now engaged in developing the three Government-owned yards. This cross-examination was in part as follows:

Senator Johnson's Questions

Senator Johnson. Do you know who are the particular engineers or experts in charge of the Submarine Boat Co. and the Hog Island yard, which are building the greater number of fabricated ships?

Mr. Powell. No; I do not know who are in charge of those different propositions.

Senator Johnson. So that you have never talked with any of them?

Mr. Powell. Yes; I have discussed it, but only to a limited extent, with the manager of the Submarine Boat Co.'s yard. Senator Johnson. Has he the same opinion as you?

Mr. Powell. Oh, no; he believes he is going to make it go.

Senator Johnson. Then there is a difference of opinion?

Mr. Powell. Yes; but he is not a shipbuilder; he has been building bridges all his life.

Senator Johnson. And the men in charge of the Hog Island yard—they have been building what?

Mr. Powell. I do not know what they have been building, but there are not any shipbuilders that I know of.

Senator Johnson. We are paying \$7,000,000 or thereabouts for the "know how" there, so there must be some remarkable shipbuilders there?

Mr. Powell. I am not in a position to answer that question.

We have at the present time a committee that represents the Atlantic Coast Shipbuilders' Association, an association that nearly all the older shipyards on the Atlantic coast belong to. This committee of five members—Mr. Homer Ferguson, as chairman; Mr. Hand, president of Cramp's; Mr. Kneeland, president of the New York Shipbuilding Corporation; Mr. Downey; Mr. Hunter, as secretary, and myself, representing this association—meets in Washington every other Friday, and Mr. Piez and Mr. Hurley meet with us and spend a couple of hours discussing any questions that involve matters of policy for the Shipping Board or questions that are interesting to all the shipbuilders.

Senator Johnson. Do these gentlemen that you have named have the same opinion as you as to fabricated ships?

Mr. Powell. Without exception, I think. I know Mr. Ferguson and Mr. Hand agree with me.

Delay While Learning

Mr. Powell emphasized to the committee his opinion that in all three of the Government-owned yards the ships contracted for would be built, but he also repeated very positively that the building would be materially delayed while the contractors were learning the lesson that it is impracticable to fabricate ships beyond the point now recognized as the limit by experienced builders.

"I think it is extremely unfortunate," said Mr. Powell, in concluding his remarks on this subject, "that the people who have spent their lives in shipbuilding did not have a chance to go into the consultation when this subject of fabricated ships was under consideration, because that was the time to stop it. Anything you do now to change it is only going to make more delay."

That a second serious blunder, which he described as "a great shipbuilding mistake," was made in undertaking to locate three great Government-owned yards within 50 miles of each other and in planning the building of no less than 50 shipways in a single yard, was another specific criticism of the policy of the ship-

ping board that aroused the liveliest interest among members of the Senate Committee.

"Do you not think," asked Chairman Fletcher, "it was likewise a mistake to locate three great shipbuilding plants within a radius of 50 miles in an already congested industrial center?"

"I should say that was a great mistake," replied Mr. Powell. "They should have been spread over a much larger area."

Makes Stirring Appeal

Taking up the subject of labor, especially that employed in shipbuilding, Mr. Powell made a stirring appeal to the committee to initiate a movement designed to bring home to the workers the extent to which their co-operation will aid in winning the war. At present, he said, conditions were deplorable. This unfortunate situation, in his opinion, was due to the fact that the demand now largely exceeds the supply, "labor being in the same condition now that the steel business was in before the price of steel was fixed, when the steel manufacturer got any price for his steel that his customer happened to be willing to pay, although it might have no relation whatever to the value of the steel."

"I think," he continued, "that because labor has found itself in this position, it has reached a point where it fails to appreciate the great necessity of the present situation. We find in our yards—and I had this report from each one of our yards all over the country; this is not common to any one locality or to any one class of labor—that the men do not get into the work and do anything like what they could do or anything like what we used to get out of our shipyards when we were down on a comparatively small basis, with labor that had been with us for a good while."

Future of the United States

"Now, personally, I believe that we are only beginning to get into this labor situation; that it is going to be the great big thing in this country for the next decade, and that whether it is handled well or whether it is handled badly, is going to be the thing that settles the future of the United States. I have been preaching for the last two or three months now that a campaign of education that will reach everybody in this country is the most vital need of the situation. I have heard Mr. McAdoo say that money would win the war, and I have heard Mr. Hoover say that food would win the war, and I have heard Mr. Daniels say that the Navy would win the war, and I have heard Mr. Hurley say that ships will win the war; but I want to say to you gentlemen that the only thing that will win the war is the spirit of American labor, and if we can train American labor and all the rest of the Americans to a real understanding of what this situation is and what the demands are on them, if we can get them to take the same interest in doing their work every day that I am taking in trying to do my work every day, we will get a whole lot more ships in the next few months than any one of us dares to dream."

Replying to questions by members of the committee Mr. Powell said that the excessive demands made by labor were due in part to the feeling that manufacturers were reaping enormous profits, a feeling that was well based a year ago, but for which to-day there is no foundation owing to the enactment of the excess war profits tax and other revenue measures. The business of the country, he said, was now largely controlled by statute.

Must Control Labor

"But you have not controlled labor," he said, "and you have got to do it. We do not have anything whatever to say to-day about how much we pay the various

trades in our establishment. It is fixed for us by the Navy on its standard of navy-yard pay on this coast, and on the West coast by the labor adjustment board appointed by the President. This same labor adjustment board is now handling the wage question on this coast, and I understand that there are going to be further adjustments, and every adjustment is an adjustment up. This is not coming out of the shipbuilders' pockets. The United States Government is paying practically every cent of it, but the experience of every manufacturer who has gone through a period of rapidly rising wage rates is that unless you do something parallel with it you do not begin to get increased production as you increase your wages. The men in any one of our plants who find their wages enormously increased are very apt to decrease the amount of work they do, so that their net return is not much more than it was before.

"I believe that if a campaign of education could be started—started by the President of the United States, because this is the biggest thing there is in this country to-day—and could be pushed with every force of the Government and using every possible means of reaching the people—a campaign that would make any political campaign that was ever run look like a little piking affair, a campaign that would put the best speakers there are in the country into every shipyard, that would use the organized forces of the women, that would use the moving-picture shows and the churches, and everything that would reach labor to let them see what the country is up against and what they could do in this crisis—I believe that it would do more to build up your shipbuilding program than all the money you can put into it and all the wages you can give and all the training you can do put together. We tried that at the time the war broke out in one of our shipyards. We had Mr. Taft and one of the well-known war correspondents, and the mayor of Boston, and a number of other eloquent speakers, go into the shipyards and talk to the men. We had meetings nearly every noon, and I want to say that inside of two months it put a different spirit into that place. It is really one of the nicest illustrations of what can be done that I ever expect to see. I know we staved off a strike thereby that was imminent. But no one yard can do that sort of thing permanently and get the results. It is something that has got to be handled as a great, big movement, backed by the highest power in this land; and I want to tell you gentlemen that if you can start up that sort of a movement by anything that this committee can do, you will have started something really for the winning of the war."

Labor Would Respond

"You feel that labor itself would respond to such a movement and understand the situation?" asked Chairman Fletcher.

"I have not the slightest doubt of it," replied Mr. Powell. "I have always made it a rule when I was at the shipyard to see any man who wanted to see me. Every man knew that the door was open, and the average American workman, as I have seen him and know him, is a perfectly decent sort of a fellow. He has plenty of intelligence, a good standard of education, and when you can get right down to facts with him you can pretty nearly teach him what is right. There are some forces at work that are not steering labor in the right direction, and something has got to be done to counteract them before they get a start."

Replying to a question by Senator Calder concerning the wisdom of conscripting or commandeering labor, Mr. Powell said:

"I do not believe it is practicable. If you want to accomplish big things in this world you have got to have people with their heart and soul in what they

are doing. The only way we can build ships is to have the men want to build the ships—I mean to really build ships—and anything you do that takes away from labor that spirit, that desire to put the best that is in them into their ship, is going to defeat the end we are after. I did believe in the early stages of this war that probably that was the way to solve the proposition, that they ought to start with me and commandeer everybody down the line, but the further this situation has developed the more it has been borne in on me that that is not the way to get the best results; that if you can not get something more than what you force a man to give you are not going to get very far.

"I should like to make this committee feel a small part of what I feel about the necessity of educating labor, and if I could do that and get you to start something in that line it will be the best day's work I have ever done in my life. I believe that is the crux, the heart and soul of this whole thing. It is the most important thing that is before the American people to-day."

Cost-Plus-Profit Plan

Severe strictures on the cost-plus-profit form of contract were made by Mr. Powell, who declared that it had fundamental faults. "We have had two types of contract with the Navy Department," he said. "The first lot of ships we built for it after the war commenced and the ships that we had on contract before were built on a cost-plus 10 per cent basis. We did not like that basis. It was something that we were forced into because we could not seem to agree with the Navy Department on any other system whereby we were guaranteed against loss, and so we finally accepted it as the only basis on which we could get together. As the work on these vessels proceeded the various disadvantages of that form of contract became more and more clear, so that when we came to the later boats we built them on a fee basis; that is, the amount that we earned on those boats is a fixed sum per boat, but we agreed with the Navy Department on what the boats should cost and anything that we can save on that sum we share with the department. I am a little proud of these last naval contracts, because I had a great deal to do with framing them up, and I think it is the cleanest and straightest form of Government contract that has ever been drawn.

"These contracts give us an incentive to keep the cost down, and at the same time we are protected against expenditures beyond our control. We are being asked to put on men at enormous wages to speed up ships at an enormous rate, to work overtime and to do other things that are not economical, and that will not pay and, of course, such things are beyond our control. We do have, however, the opportunity to increase our fee if we can keep below the estimated cost."

Vessels of Concrete

Mr. Powell expressed himself as wholly unconvinced that there was anything practical in the suggestion that transatlantic vessels could be built of reinforced concrete. All concrete, he said, was apt to crack, and the vessel that cracked at sea would be a very difficult proposition to deal with. He would much prefer that a concrete ship should be sent across the ocean several times before he took passage on her. At the same time, he said, he believed that in view of the fact that such vessels, according to report, could be constructed in a very few months, the Government would be amply justified in building half a dozen for purely experimental purposes. He felt sure, however, that there was nothing in the outlook as to the usefulness of these ships that would justify embarking upon their production on a large scale.

W. L. C.

CORRESPONDENCE

How Manufacturers Can Help in Solving Transportation Problems

To the Editor: Having had four years' practical experience in all branches of freight and passenger work at a railroad station and more than 40 years' experience as general manager of the Stanley Works, New Britain, Conn., the largest manufacturer of wrought steel door butts in the world, I feel warranted in making the following suggestions to managers of railroad companies, manufacturers and others.

I am decidedly in favor of more hearty co-operation of manufacturers, coal and lumber dealers, merchants and others in aiding the managers of railroad corporations to secure promptness in loading and unloading cars. I am sure that if manufacturers and others who receive a large number of cars daily were to give the same careful attention to unloading cars that they give to their own business, also to prompt loading of cars for shipment, railroad companies would not be obliged for several years to purchase many new cars or locomotives for switching cars. Co-operation by practical men representing railroad companies, manufacturers and others, coupled with authority to work in harmony by making improvements in "side tracks," increasing size of coal bins and coal pits, and providing for dumping more than double the present quantities of coal per hour, would much reduce the number of cars required for such traffic. Manufacturers can help greatly by spotting cars with their own locomotives, switching all empty cars to a side track ready for removal by railroad companies without being compelled to switch a loaded car.

I am sure that there are a great many shippers who handle a sufficient quantity of material to warrant the installation of overhead electric cranes, ordinary cranes and locomotive cranes equipped with magnets for handling metals. Wherever conditions warrant such equipment for unloading and loading cars there will be a saving of 50 to 75 per cent in time and large saving of money by the owners.

Building modern steam boiler plants of three stories, with coal bunkers on the third floor, boilers on the second floor, cinders dumped to the ground floor, coal transferred from coal pits by endless belts to the third floor, fed from bunkers to boilers by the use of Roney stokers, will not only aid railroad companies but will be a profitable investment.

Two side tracks adjoining and parallel for loading cars from storehouses, trucking materials direct to the nearest car and across the flooring of the nearest car to the car adjoining, will prove to be a saving of money.

Loading steel in coils by transmission belts from rolling mill to cars reduces cost and releases cars more promptly.

Steel billets are unloaded by use of a locomotive crane and magnet at a cost of less than 4 cents per ton.

I am writing from practical knowledge regarding Stanley Works equipment for aiding railroad companies and economizing in handling freight.

If manufacturers and others wherever practicable will add equipment for reducing the number of workmen required for loading and unloading cars it will be a great advantage to the Government at shipyards and at all plants furnishing supplies for war purposes.

WILLIAM H. HART.

ORMOND BEACH, FLA., Feb. 7, 1918.

Heat Treating and Hardening Tool Steel Bushings

To the Editor:—I have had considerable experience the past two years in the hardening of tool steel bushings. I have had them crack sometimes after hardening and drawing the temper. The manner in which I have been more successful in hardening the bushings, etc.,

is as follows: Always anneal them at a temperature about 15 deg. Fahr. higher than the hardening or critical point, such a process taking care of all the internal strains that may be caused by the rolling of the metal at the steel mill and the machining of it at the machine shop. Clean off all surfaces by washing in a strong solution of soda and lye water. Dry and polish with emery cloth. Pack in some good carbonizing material and carbonize at a temperature of 1500 deg., the necessary length of time to give the outer surface the required depth of case to make a good, hard surface after all surplus stock has been removed by grinding. The case left after grinding should not be less than 0.010 in. and not to exceed 0.015 in.

After the proper length of time for carbonizing remove from the carbonizing material and quench in a good grade of quenching oil, preferably pure raw cottonseed oil or raw linseed oil, and allow for thorough cooling before drawing the temper. All articles of a slender nature or those having sharp corners, etc., can be treated likewise; then draw the pack-hardened article or articles at 400 deg. Fahr. This process gives a high degree of hardness and toughness and also prevents the outer surface from scaling and oxidizing and lessens the possibility of warping.

Such a process is economical from two points: The cost of material and the cost of machine work.

E. S. BROWN.

INDIANAPOLIS, IND.

Georgia Steel Co. Suit Decided

The Georgia Iron & Coal Co., Atlanta, Ga., Joel Hurt, president, has won a favorable decision in the Federal Circuit Court of Appeals in New Orleans, La., in its suit against the Georgia Steel Co., a bankrupt concern. The decision will release for sale and development about 45,000 acres of land, lying chiefly in Cherokee and Bartow counties, Georgia, which contain deposits of manganese ore, as well as coal and iron ore. Mr. Hurt informs THE IRON AGE that as soon as these properties shall have been sold, the mining of manganese ores will be prosecuted actively and coal sufficient for these operations will be obtained from the same land. "The deposits of manganese ores are extensive and practically inexhaustible," states Mr. Hurt, "but the mining of them is now suspended for lack of coal. Iron ore, both red and brown hematite, are also in abundance."

The decision followed long and stubborn litigation as to whether the Georgia Iron & Coal Co. had a lien upon the property. The referee decided that the company had no lien, but that decision was reversed in the Federal District Court at Atlanta, which is now sustained by the higher court.

A blast furnace owned by the Georgia Steel Co. at Rising Fawn, Ga., is included in the property. This furnace, which has a capacity of 72,000 gross tons annually of foundry iron, has not been operated since 1907, but will be brought into use in the near future. The equipment has greatly depreciated and much of it will have to be renewed.

The Georgia Steel Co., defendant in the action, is owned by the Gulf States Steel Co., the capital stock consisting of 25,000 shares of a par value of \$100 each, but the property has been carried on the books of the Gulf States Steel Co. at a nominal value.

The name of the Osborn Mfg. Co., Cleveland, has been changed to the Cleveland Osborn Mfg. Co., Inc. A. T. Atwood, formerly Chicago manager, has resigned and C. D. Eadie, Southern manager, succeeds him. E. W. Cannell, formerly advertising manager, becomes his assistant at Chicago. F. P. Spratt, formerly assistant at Chicago, has been transferred to assistant-managership of its New York office, following the resignation of Jack McKeith.

The Donner Steel Co. has established a New York office in the Equitable Building, 120 Broadway, New York, room 2149.

Machinery Markets and News of the Works

BIG BUYING TO COME

Government's Requirements of Tools Will Be Heavy

Savage Arms Corporation Comes Into Market for Large Number of Tools

Reports from Washington are to the effect that as soon as the present reorganization of the War Department is completed many large contracts for shells and other munitions will be released. In addition, the Ordnance Division will place orders for thousands of machine tools for its various arsenals and for shipment to France.

More war buying has been noted in New York during the past week than has been known this year. The Savage Arms Corporation, Utica, N. Y., is one of the largest buyers, its requirements totaling several hundred new tools. The capacity of the Utica plant will be doubled, increasing the output of Lewis machine guns from 130 to 300 per day.

The Pollak Steel Co., Cincinnati, is reported to have closed a contract for 8-in. shells, while contracts for 9.5-in. shells have been awarded to the Picatinny Arsenal, Dover, N. J., where extensive additions have

been built, and the A. P. Smith Mfg. Co., East Orange, N. J.

The Gas Defense Plant, Medical Department, United States Army, Long Island City, N. Y., has inquired for 10 sensitive drills for work on gas masks.

Expansion of the plant of the Duesenberg Motors Corporation, Newark, N. J., has already been begun. The factory will be doubled in size for work on 2000 Bugatti aviation motors. The Duesenberg corporation has also taken over the facilities of the Fiat automobile factory at Poughkeepsie, N. Y. The Simplex Automobile Co., New Brunswick, N. J., has bought 20 internal grinders for work on Hispano-Suiza aviation motors. The H. H. Franklin Mfg. Co., Syracuse, N. Y., has decreased its automobile output 40 per cent and is devoting the equipment thus released for work on parts of Rolls-Royce motors for the British Government. Several new tools have been bought.

Other purchasing in the New York market consists mainly of small lots.

There is more competition for crane orders than has been evidenced in many months. Deliveries of standard cranes from the older companies range from four to six months.

In Chicago the principal inquiry of the past week came from the Standard Steel Car Co., Hammond, Ind., which requires a large number of miscellaneous tools.

New York

NEW YORK, Feb. 12.

War buying has been resumed on a fairly large scale in the New York machine-tool market. One of the largest lists in some months has been issued by the Savage Arms Corporation, which will buy several hundred new tools for its Utica, N. Y., plant, more than doubling its capacity. The Utica factory is at present turning out 130 Lewis machine guns for aircraft service per day. The new equipment is being added with the aim of increasing the output to 300 guns per day.

New shell contracts are being awarded in Washington, the forerunner of a large number which will be entered into as soon as the present reorganization of the War Department has been completed. The A. P. Smith Mfg. Co., East Orange, N. J., is reported to have closed a contract for 9.5-in. shells, and shells of this size will also be made at the Picatinny Arsenal at Dover, N. J., where the Stone & Webster Engineering Corporation has been constructing new buildings during the past few months. The Pollak Steel Co., 120 Broadway, New York, whose plant is at Cincinnati, has received a contract for 8-in. shells. None of these shell makers has entered the market as yet for new equipment. It has been known for some time that the Picatinny Arsenal would eventually buy a large number of tools for ordnance work.

The Gas Defense Plant, Medical Department, United States Army, at Long Island City, N. Y., has issued an inquiry for 10 sensitive drills for work on gas masks. The Engineers' Depot at Harrison, N. J., is buying a few tools. The New York Air Brake Co., Watertown, N. Y., has inquired for two boring mills. The S K F Ball Bearing Co., Hartford, Conn., will buy a number of external grinders. The Simplex Automobile Co., New Brunswick, N. J., at work on Hispano-Suiza airplane motors, has bought 20 internal grinders. The Duesenberg Motors Corporation, Newark, N. J., has broken ground for an addition to its plant, doubling its size for work on 2000 Bugatti airplane motors, for which a contract has been received from the United States Aircraft Board. This concern will also utilize the facilities of the Fiat automobile plant at Poughkeepsie, N. Y., in fulfilling its contract. It is probable that considerable new equipment will be bought.

The H. H. Franklin Mfg. Co., Syracuse, N. Y., at work on parts of Rolls-Royce aviation motors has bought several tools. This company is decreasing its production of automobiles by 40 per cent and devoting the equipment thus released to aviation motor work.

Other purchasers of small lots of tools in the past week are the Watervliet Arsenal, Watervliet, N. Y.; the Babcock & Wilcox Co., Bayonne, N. J.; Standard Roller Bearing Division of the Marlin-Rockwell Corporation, Philadelphia, and Arthur Brock, Jr., Philadelphia. The latter bought a number of screw machines. The Newburgh Shipyards, Inc., New York, has bought a plate planer and two punching machines.

Crane business shows some activity and there is more competition for business than has been known for many months. Among the older companies deliveries are now from four to six months. The Brooklyn Rapid Transit Co. will close this week for a 100-ton electric traveling crane, 85-ft. span, for its new Williamsburg power house. The American Smelting & Refining Co. has bought a 10-ton crane for shipment to Chile from the Northern Engineering Co. The Magor Car Co., 30 Church Street, New York, has bought two 10-ton cranes for its car works at Passaic, N. J. The Pensacola Shipbuilding Co., Pensacola, Fla., is in the market for one 3-ton crane, but will issue a larger list soon. Hugh L. Cooper & Co., New York, will buy a 15-ton 4-motor crane for a new hydroelectric power station at Rochester, Minn. The General Electric Co., Lynn, Mass., has ordered a 20-ton crane from the Northern Engineering Co., but up to to-day had not closed on the remainder of its recent list, which includes two more 20-ton cranes, one 15-ton, one 7½-ton and one 2-ton. The Foundation Co. is in the market for a 5-ton crane of 65-ft. span for its shipyard on the Newark Meadows, but it was said in the trade that a second-hand crane would probably be bought because prompt delivery is required. The Virginia Shipbuilding Corporation, Alexandria, Va., has not yet closed for the four 5-ton cranes for which an inquiry was recently sent out.

The Du Pont Powder Co., Wilmington, Del., will buy six or eight locomotive cranes for work in constructing new powder plants for the United States Government. A large quantity of machinery, including many small cranes, will

undoubtedly be bought soon for these plants. Equipment for the machine shops will also be required.

Rapid progress is reported by the Driver-Harris Co., maker of wire, strip, etc., Harrison, N. J., in re-establishing manufacturing operations stopped by the destruction of its two buildings containing the storeroom for raw materials and finished stock; chemical laboratory, testing room, one shipping room, one wire-spooling department, and the electrical cord and wire-insulating department. More than half of the machinery required for electrical cord production and other required new equipment has been purchased and is now on the way to the plant. Temporary quarters have been provided. The manufacture of its other products, including those of the wire-drawing and cold-rolled sheet departments and foundry, has not been interrupted. E. A. Harleman is purchasing agent.

The Mechanical Handior Company, Hudson, N. Y., will erect a brick and steel building, 90 ft. long and 72 ft. high, which it plans to complete in 45 days. It is actively engaged in the manufacture of lifeboat davits. Arthur Gifford is president.

The Monarch Steam Blower Co., Troy, N. Y., whose plant on Oakwood Avenue was damaged by fire Jan. 27, will move its works on Feb. 15 to a new shop on North Street. T. J. Sheehy is secretary.

The Krantz Mfg. Co., 160 Seventh Street, Brooklyn, manufacturer of switchboards, etc., has awarded contract for an addition to its four-story plant to cost \$35,000.

The Dobbins Core Drill Co., 149 Broadway, New York, has been incorporated with a capital of \$100,000 by T. H. Dobbins, 615 West 143d Street; P. J. Diemunsch and E. A. Ball.

The Bordentown Steel & Tube Corporation, New York, has been incorporated with a capital of \$250,000 to manufacture tubing, etc. J. T. Abeles, L. H. Sanders and S. M. Lazarus, 2 Rector Street, are the incorporators.

The William P. Davis Machine Tool Co., Inc., New York, has been incorporated with a capital of \$200,000 by W. P. Davis and B. B. Ketcham, 85 Liberty Street, and W. Allen, 149 Broadway.

The Century Metal Spinning & Stamping Co., 247 Centre Street, New York, has increased its capital from \$10,000 to \$40,000.

The West Virginia Pulp & Paper Co., 200 Fifth Avenue, New York, will make extensions in its different plants to cost about \$1,000,000. Contract has been awarded for the construction of eight new buildings at Tyrone, Pa., to form a new unit for the present works at this location for increased capacity. At Piedmont, Va., the company will also build a similar plant to cost over \$300,000, and at its Mechanicsville, N. Y., plant four new plant buildings will be constructed.

The Conserver Mfg. Co., New York, has been incorporated with a capital of \$125,000 to manufacture special machinery and hardware specialties. C. G. Campbell, F. J. Kent and S. S. Newton, 73 Cortlandt Street, Brooklyn, are the incorporators.

The Remacle-Hummel Gear & Machine Works, New York, has been incorporated with a capital of \$20,000 by F. H. Hummel, L. L. Remacle and J. J. McKenna, 63 Park Row.

The Continental Shipbuilding Co., New York, associated with the Maaten Construction Co., 103 Park Avenue, will build a two-story shipbuilding plant, 50 x 100 ft., at the Ludlow Dock, Yonkers, N. Y.

The Aero Instrument Corporation, New York, has been incorporated with a capital of \$500,000 by J. W. Lovell, 516 Fifth Avenue; B. S. Ray, 429 Sterling Place, Brooklyn, and N. W. Walker, 94 Park Avenue.

The Eastern Zinc Refining Co., 25 Church Street, New York, has increased its capital from \$15,000 to \$30,000.

The Metal Package Co., 346 Carroll Street, Brooklyn, manufacturer of metal containers, has filed articles of incorporation as the Metal Package Corporation of New York, with a capital of \$1,000,000. C. C. Harper, 432 Washington Avenue, Brooklyn; F. J. Knorr, Brooklyn; and M. M. Pedlow, Albany, N. Y., are the incorporators.

The F. D. Schussler Mfg. Co., New York, has been incorporated with a capital of \$100,000 to manufacture tools, electrical goods, etc. F. D. Schussler, T. C. Miller and T. Moran, 259 Eighty-first Street, Brooklyn, are the incorporators.

The Deboer & Bach Co., New York, has been incorporated with a capital of \$20,000 to manufacture cutlery, surgical instruments, etc. E. M. Bach and L. and D. H. Doboer, 215 West 101st Street, are the incorporators.

The Universal Mechanical Products Co., 330 East Ninety-eighth Street, New York, manufacturer of metal specialties, has increased its capital to \$50,000.

A one-story boiler plant to cost about \$15,000 will be erected by Charles Pfizer & Co., Brooklyn, at their works at 11 Bartlett Street.

J. Potter & Son, Inc., Richmond Hill, L. I., has been incorporated with a capital of \$15,000 to manufacture metal specialties. Justus and Elmer Potter, Richmond Hill, are the incorporators.

The Harvis Machine Co., New York, has been incorporated with a capital of \$10,000 by D. M. Mahood, J. H. Noll and A. P. Davis, 542 West 112th Street.

The American Corrugated Steel Wheel Co., New York, has been incorporated in Delaware with a capital of \$1,000,000 by George V. Reilly, Samuel B. Howard and A. W. Britton, 65 Cedar Street, New York.

The Government has leased property at South Brooklyn from the Bush Terminal Co. and the city of Brooklyn, consisting of a tract bounded by Second and Third avenues, Twenty-ninth and Thirty-second streets. The site will be used for the erection of several large factories for the manufacture of products for army service. It is said that plans are being prepared for the construction of two initial buildings, each eight stories, U-shaped, about 200 x 700 ft., with 75-ft. wings. Warehouses will also be erected for shipping service.

Westinghouse Church Kerr & Co., 37 Wall Street, New York, engineers, are building a new forging works on Hydraulic Avenue, Cleveland, for the Hydraulic Pressed Steel Co., East Sixty-first Street, Cleveland. It will be 80 x 160 ft. and cost \$200,000.

The Forge Products Corporation, New York, has been incorporated with a capital of \$160,000 to manufacture high-speed steel products. G. F. Jebbett, 120 Sherman Avenue; J. C. Pedlow, 33 Bertha Street, and M. M. Pedlow, 69 Fourth Avenue, are the incorporators.

The Astoria Light, Heat & Power Co., Long Island City, N. Y., has filed plans for a new two-story plant, 44 x 175 ft., on Winthrop Avenue, to cost about \$20,000.

Frederick Welsbred, Jr., New York, and associates have incorporated in Delaware the Liberty Steel & Foundries Co., with capital of \$1,500,000 to manufacture steel castings.

The A. B. Welding Works, New York, has been incorporated with a capital of \$25,000 by D. R. Brown, E. H. Hopkins and H. E. Sears, 308 East 142d Street.

The Germania Cornice Works, Brooklyn, has removed its plant from Greene Avenue to 1424-26 Metropolitan Avenue to provide increased capacity.

The Benson Electric Co., New York, has been incorporated with a capital of \$250,000 to manufacture specialties. H. S. Leman, R. Goldman and A. H. Bloch, 507 Westminster Square, Brooklyn, are the incorporators.

A new power plant will be erected in connection with the new silk mill planned by Ernest & Herman Levy, Fourth Avenue and Nineteenth Street, New York, to be located at Purdy and O'Dell streets. The new works are estimated to cost \$75,000.

The Dutchess Motor Specialties Corporation, Poughkeepsie, N. Y., has been incorporated with a capital of \$50,000 by A. L. and W. H. Sherrill, 75 Washington Street, and H. W. Sherrill, 23 Balding Avenue, Poughkeepsie.

The Ideal Wrapping Machine Co., 81-87 Sprague Street, Middletown, N. Y., has increased its capital from \$150,000 to \$300,000.

The Roberts Safety Water Tube Boiler Co., Red Bank, N. J., is building an addition to its plant.

The Atlantic Loading Co., 71 Broadway, New York, is planning the erection of a works near Whiting's Station, N. J., to be used exclusively, it is reported, for the manufacture of ammunition for the Government. It was recently planned to locate the plant near Brown's Mills, in the vicinity of Camp Dix, but owing to water supply conditions it has been decided to change the site.

The McKinnon Rockaway Axe Co., Rockaway, N. J., manufacturer of axes, has acquired a factory of the former Rockaway Brick Co. for a new works. Its plant on Main Street was recently destroyed by fire and it has been decided to sell the site.

The proposed extension to the plant of the Duesenberg Motors Corporation, Newark Avenue, Elizabeth, N. J., will consist of a superstructure for the one and two-story building, 140 x 440 ft., adjoining its main works.

The Blast Furnace Products Corporation, recently incorporated in Delaware, has acquired the former plant of the New Jersey Zinc Co., on the Hackensack River, Kearny, N. J., fronting on the Newark Plank Road and consisting of about 12½ acres. The sale price is reported to be \$350,000. H. W. Cooper is local representative for the company.

The Mutual Iron Works, Jersey City, N. J., operating a

plant at 907 Communipaw Avenue, has filed articles of incorporation with a capital of \$125,000. James McIlvrid, James McIlvrid, Jr., and Edward V. Cotter are the incorporators.

The Newark Instrument Co., Newark, has been incorporated with a capital of \$175,000 by George W. C. Carter, Daniel B. Smith and Conover English.

Buffalo

BUFFALO, Feb. 11.

The R. Ivey Co., Ltd., Buffalo, incorporated recently with a capital stock of \$30,000, has leased premises at Ellicott and North Division streets for a machine shop.

The O'Neil Iron Works, Buffalo, manufacturer of sugar-mill machinery, which recently purchased the plant of the Lake Erie Engineering Works at Perry and Chicago streets and the Lehigh Valley Railroad, is having plans prepared for an additional building to be erected this spring.

The Steinbrenner-Graf Co., Buffalo, has been incorporated by William J. Steinbrenner, Arthur F. Graf and George F. A. Graf, 253 Niagara Street, to manufacture special carbureters and other automobile appliances.

The plant of the Iroquois Foundry Co., 108 Brown's Race, Rochester, was damaged by fire last week with a loss of \$45,000. Plans to rebuild are under way.

Plans have been completed for the rebuilding of the factory of the Shinola Co., manufacturer of shoe polish, etc., on Frankfort Street, Rochester.

Booth Brothers, Rochester, manufacturers of shoe machinery, have completed plans for rebuilding their plant recently damaged by fire.

The factory of the High Speed Hammer Co., Rochester, for which plans have been completed, will be 53 x 101 ft., one and two stories, and will be erected on Norton Street.

The Pennsylvania Railroad Co. has completed plans for a forge and wheel shop at Buffalo, adjoining its car and locomotive repair shops on Babcock Street.

The Fulton Steel Corporation, Fulton, N. Y., manufacturer of steel castings, has had plans prepared for a factory addition.

J. C. Aitkin, 216 South Center Street, Schenectady, N. Y., manufacturer of storage batteries, will erect an addition, 50 x 80 ft., to his plant. Plans have been completed.

The Erie Pump & Engineering Co., Erie, Pa., has been incorporated to manufacture centrifugal pumps of the sand and gravel dredge type and mine-water pumps. It will also engage in general mine and breaker work and supplies, as well as in conveying and elevating machinery for sand, gravel, rock and coal. W. N. Seftes is secretary.

The Porter-Cable Machine Co., manufacturer of boring heads, etc., Syracuse, N. Y., has purchased from Harvey A. Moyer a factory on North Salina Street, containing about 50,000 sq. ft. of floorspace, to which it has removed.

The H. A. Smith Machinery Co., machinery merchant, 384 West Fayette Street, Syracuse, N. Y., has purchased the three-story factory at East Water and Grape streets from the Thomas Hooker Estate, recently vacated by the Porter-Cable Machine Co. It contains 15,000 sq. ft. of floorspace. The new owner is now remodeling it, fitting it up with suitable offices, showroom and ample space for warehousing machine tools, both new and second-hand. It is equipping the main floor with a 5-ton traveling crane and plans moving into it approximately March 1.

The Brunner Mfg. Co., 19 Gray Avenue, Utica, N. Y., manufacturer of air compressors, has increased its capital from \$50,000 to \$250,000.

The Caldwell & Ward Brass Co., 103 Decker Street, Syracuse, manufacturer of brass castings, has awarded a contract for rebuilding, at a cost of \$10,000, its plant recently destroyed by fire. At a recent meeting of the board of directors, L. F. Meagley was elected president; Isaac H. Munro, vice-president; Daniel A. Pierce, secretary-treasurer; Thomas A. Holbert, superintendent.

The Wheeler-Green Electric Co., 31 St. Paul Street, Rochester, manufacturer of electric motors, etc., has increased its capital from \$100,000 to \$500,000.

The Augustine Automatic Rotary Engine Co., 1862 Elmwood Avenue, Buffalo, is reported to have called a stockholders' meeting to increase the capital of the company from \$1,000,000 to \$1,500,000.

The General Metal Co., Buffalo, organized by Anthony N. Steiner and John J. Kelly to operate a metal and foundry supply works, will establish its works at 1459 Niagara Street.

The extension to the boiler shop of the Oldman Boiler Works, 38 Illinois Street, Buffalo, will be two stories, of steel, and cost about \$10,000.

Philadelphia

PHILADELPHIA, Feb. 11.

The Bureau of Yards & Docks, Navy Department, Washington, is taking bids for the construction of a two-story boat works, 58 x 135 ft., at the League Island Navy Yard, Philadelphia, estimated to cost \$270,000. A new one-story forge shop, 60 x 80 ft., is now being erected at the Frankford Arsenal at an estimated cost of \$50,000. As a plant for the manufacture of munitions for army service, the Government has leased the former works of the International Match Co., Wharton and Taylor streets, which it will equip and operate at full capacity.

The Sterling Iron & Steel Co., Tenth and Hamilton streets, Philadelphia, is having plans prepared for a two-story extension, 15 x 60 ft.

A new one-story furnace building, about 30 x 220 ft., of reinforced concrete, will be erected by the John T. Lewis Co., maker of leads and linseed oil, at its plant at Aramingo Avenue and Huntingdon Street, Philadelphia, at an estimated cost of \$20,000.

The Wellens-Kinto Clock Co., Philadelphia, has been incorporated in Delaware with a capital of \$100,000 to manufacture motor-operated clocks and other automatic equipment. F. R. Hansell, Land Title Building, Philadelphia, and S. C. Seymour, Camden, N. J., are the incorporators.

The New York Shipbuilding Corporation, Camden, N. J., has awarded contract for a one-story extension, 45 x 300 ft., to cost about \$50,000.

The Caloric Furnace Co., Camden, N. J., has been incorporated with a capital of \$100,000 to manufacture furnaces, etc. E. R. Lippincott and Grover C. Chase, Collingswood, and Joseph H. Carr, Camden, are the incorporators.

The Hess-Bright Mfg. Co., Front Street and Erie Avenue, Philadelphia, manufacturer of ball bearings, has increased its capital from \$1,250,000 to \$1,630,000.

The Schwerdtle Machine Co., Philadelphia, has been incorporated with a capital of \$15,000 by Henry G. Schwerdtle to manufacture machinery.

A one-story boiler plant, 35 x 42 ft., will be erected by Shane Brothers & Wilson Co., Sixty-third and Market streets, Philadelphia.

The Kent Mfg. Co., Clifton Heights, Pa., has had plans prepared for a steam-driven electric power plant, one-story, 40 x 68 ft., estimated to cost \$50,000.

The Titan Automatic Tool Co., Camden, N. J., has filed articles of incorporation with a capital of \$1,500,000 to manufacture automatic tools. Joseph P. Murray, Frank S. Muzzy, and J. S. Saurman, Philadelphia, are the incorporators.

The plant of the Tidioute Furniture Mfg. Co., Titusville, Pa., was damaged by fire Jan. 25 with an estimated loss of over \$75,000. It will probably rebuild, but this has not been definitely decided. E. H. Boroning is manager.

Baltimore

BALTIMORE, Feb. 11.

The Bartlett Hayward Co., founder and engineer, Baltimore, has bought between 35 and 40 acres, and is constructing a plant to employ about 3,500 men. It will be used by the company to manufacture material for the Government. The entire equipment for the plant has already been purchased. William S. Miller is vice-president.

The Cameron Stove Co., Richmond, Va., is making arrangements to erect an addition to its warehouse to cost about \$10,000. Part of the present warehouse will be used to relieve the congested condition of its foundry. No purchases of machinery are planned. Thomas W. Ellett is president.

The Liberty Lock Co., Washington, D. C., has been incorporated with a capital of \$45,000 to manufacture locks and hardware specialties. The incorporators, all of Washington, are G. L. Harrison, W. T. Chapman, and H. R. Dulany, Jr.

The Bureau of Yards & Docks, Navy Department, Washington, has awarded contract for the construction of a five-story pattern shop, 180 x 300 ft., to cost \$475,000.

The Henry W. Smith Drydock Co., Curtis Bay, Md., is planning to rebuild its plant, recently destroyed by fire with loss of about \$500,000. The new structures will comprise a number of buildings, with main works about 160 x 500 ft.

The Bureau of Standards, Washington, has awarded contract for a four-story testing laboratory, to cost about \$650,000. It will be H shaped, 167 x 350 ft.

Chicago

CHICAGO, Feb. 11.

Judging from the number of inquiries for shell-making machinery emanating from companies in this territory, the Government contemplates placing several more contracts for 6-in. shells in the Chicago district. The largest inquiry for tools now pending is one just completed by the Standard Steel Car Co., Hammond, Ind., which specifies lathes, both engine and turret; plain, vertical and Lincoln milling machines; profiling, broaching and planing machines and other tools, several of each being wanted.

Ordinary industrial demand is light, with purchases, of course, restricted to such machines as are not required for munitions manufacture. Deliveries of every sort are bad, especially of machines made in or near Cincinnati. In addition to priority orders, shipping licenses have been required before some shipments could be made.

Delivery of punch and stamping presses has been delayed in a number of cases because gears and parts which builders had arranged to have made outside their own shops have not come through at the expected time, resulting in the accumulation of a number of partly completed machines. Aside from this fault, deliveries of presses can be made with fair promptness, if railroad delays are eliminated.

The Top-Stewart Tractor Co., Clintonville, Wis., a newly organized company, has placed orders for about \$30,000 worth of machinery.

The Wisconsin Duplex Auto Co., Oshkosh, Wis., is planning to bring out a one-ton four-wheel drive truck.

The L. Wolf Mfg. Co., Chicago, has closed a Government contract and made inquiry for hand and automatic screw machines.

C. M. Conradson, Green Bay, Wis., well known as a designer of machine tools, is taking additional floor space to be devoted to designing special machinery for munitions purposes.

The Domestic Electric Appliance Co., Peoria, Ill., has been incorporated with a capital stock of \$25,000 by R. B. Cherry, V. E. Hopkins and E. G. Kuecks.

The factory of the Meikle Automobile Accessory Co., Springfield, Ill., was damaged by fire Jan. 29 to the extent of \$20,000, the loss including some recently installed machinery. The company will rebuild, meanwhile operating in a temporary shop, as soon as machinery can be installed. About 40 men were employed.

Detroit

DETROIT, Feb. 11.

The unsettled condition of industries caused by the serious shortage of coal has reflected itself in the machine-tool market, where orders are few. Deliveries on standard machines to jobbers have improved. Construction work has decreased. Unskilled labor is plentiful but there is a dearth of skilled mechanics for munition work.

Scores of large plants throughout the state have been forced to shut down indefinitely, due to the lack of fuel. In Detroit it is estimated 45,000 men are out of work. Throughout the state the situation is even more serious, and Jackson, Lansing, Grand Rapids, Saginaw and other industrial centers are facing a practical coal famine. Warmer weather has somewhat improved the situation. Shipbuilding companies are working day and night, and munition factories are working as actively as the coal supply permits. Automobile factories are gradually turning over a large portion of their plants to munition work.

Five new units are being constructed for the Lincoln Motors Co., Detroit, manufacturer of the Liberty motor. A heat-treating plant, assembly plant, two testing buildings and a one-story factory are included. Henry M. Leland is president.

The Wolverine Tractor Co., Detroit, manufacturer of a combination caterpillar and straight tractor, is reported to be moving to Saginaw, Mich., where it will occupy the building of the Bransfield-Billings Action & Supply Co.

The Morning Star Stove Mfg. Co., Grand Rapids, Mich., has been organized by H. A. Paquette, Chicago, and N. Paquette, Grand Rapids. The gas heater, which will be put out by the company, will be manufactured by the John Knappe Machine Co., Grand Rapids.

The Timken-Detroit Co., Detroit, has let contract for a three-story brick and reinforced concrete addition to its plant.

The Denby Motor Truck Co., Detroit, has let a contract for an assembling plant on its factory site at Holbrook Avenue and the Grand Trunk Railway.

The Central South

LOUISVILLE, Feb. 11.

Considerable improvement has been shown in conditions in this section as a result of moderating weather. Transportation conditions have shown improvement, and there is a better chance of outdoor work starting again, after a lay-off of two months or more. Coal is moving much better, although mine run at present is being brought to Louisville in box cars, due to a big shortage in open cars. Local foundries and machine shops are generally busy.

The Roy C. Wayne Supply Co. of Louisville is in the market for a used equipment, including a 100 to 115 hp. locomotive fire box type boiler, two ½ yd. clamshell buckets, also two clamshell buckets of 1 to 1½ yd. capacity for shipment to Kansas City, Mo.

Plans are being formulated by the State of Indiana to rebuild its reformatory at Jeffersonville, burned Feb. 6, with a loss estimated at \$500,000 to \$750,000 including trade shops, raw and finished materials, machinery, etc. The shoe shop and several other departments were destroyed, the broom factory and tin shop being about the only ones saved. Rebuilding will be held up until money can be appropriated. A good deal of machinery of one kind or another will be required, but no statement can be had at this time.

The machine shop of Mike Welder, Louisville, has been working on 24-hr. schedule the past few weeks in order to get out special milling machinery for Buckley Brothers, Louisville, who are supplying mills with grain separators.

The Anglo-American Mill Co., Owensboro, Ky., manufacturer of flour mills, recently filed articles of incorporation increasing the capital stock from \$650,000 to \$1,000,000, it being planned to increase facilities for manufacturing.

Karnes & Speer, a new firm at Campbellsville, Ky., is installing a machine shop on Main Street in the former headquarters of the Campbellsville Lighting Co. J. M. Karnes for the past three years has been operating a machine shop at Columbia, Ky.

The Elkhorn Coal & Coke Co. of Louisville was recently incorporated with a capital of \$1,000,000 by Leon P. Lewis, W. M. Viser, Jr., and M. E. Simerman.

The National Hame & Chain Co., New Albany, Ind., is planning to rebuild sections of its plant which were wrecked recently when a snow laden roof collapsed, wrecking machinery and equipment. The damage was estimated at \$5,000.

The proposed plant of the Harriman Foundry & Machine Works, Harriman, Tenn., to occupy the site of the former Harriman Cotton Mills Co., recently acquired, will consist of an erecting shop, 60 x 200 ft.; a forging works, 80 x 100 ft., and a machine shop, 40 x 60 ft., and a one-story foundry, 72 x 120 ft., of 150 wheels daily capacity. The new plant will be used for the manufacture of mine cars and heavy equipment for contractors' service.

The Norton Coal Mining Co., Nortonville, Ky., will build a one-story addition to its power plant for works operation.

The National Body & Mfg. Co., Nashville, Tenn., has been incorporated with a capital of \$75,000 to manufacture motor trucks and automobile bodies. C. R. Wood, Louis Steinberg and J. K. Cravens are the incorporators.

Canada

TORONTO, Feb. 11.

Robert H. Hassler, Ltd., Indianapolis, Ind., is making preparations for the erection of a plant on Sherman Avenue, Hamilton Ont.

The washing machine and truck departments of the London Foundry Co., London, Ont., are being removed to Hespeler, Ont., where the company proposes to manufacture these lines on a larger scale.

The Colonial Lumber Co., Pembroke, Ont., will commence at once the erection of new mills to cost \$75,000.

The Holmes Foundry Co., Sarnia, Ont., will commence at an early date the erection of a foundry to cost \$100,000.

The Bond Engineering Works, Ltd., Toronto, which recently took over the plant of the Queen City Foundry Co., will make several additions and install new machinery.

The Dominion Cement Co., 92 Notre Dame Street East, Montreal, is having plans prepared for the erection of a plant to cost \$100,000.

The George McLagan Furniture Co., Ltd., Stratford, Ont., is in the market for a horizontal tubular steam boiler, approximately 16 ft. long by 6 ft. in diameter.

The plant of the Toronto Laundry Machinery Co., Sorauren Avenue and Dundas Street, Toronto, was totally destroyed by fire Feb. 5, with a loss of \$200,000. It had been

occupied for some time in the manufacture of shells, etc., and will be rebuilt immediately. Controller O'Neil is head of the company.

The Allan & McKelvie Engineering Co., Ltd., Vancouver, B. C., has been incorporated with a capital stock of \$50,000 to take over the plant and business of Allan & McKelvie, to manufacture machinery, iron, etc.

The St. Maurice Foundry Co., Three Rivers, Que., is making extensions of its plant at a cost of \$60,000. Paul Dumoulin is secretary.

The Steel Company of Canada, West Brantford, Ont., has commenced the erection of an addition to its munition plant to cost \$9,000.

The British Explosives, Ltd., Renfrew, Ont., is in the market for two 55-hp. motors. W. C. Cram is general manager.

The Page Wire Co. of Canada, Walkerville, Ont., which proposes to establish a plant at Three Rivers, Que., at a cost of \$150,000, will be in the market shortly for motors, etc.

The Leonard Steam Trawlers, Ltd., Montreal, has been incorporated with a capital stock of \$250,000 by Henri G. Lajoie, Alexandre Lacoste, Thomas J. Shallow and others, to build ships.

The Franklin Railway Supply Co. of Canada, Ltd., Montreal, has been incorporated with a capital stock of \$25,000 by John S. Coffin, Montreal; Joel S. Coffin, Samuel G. Allen and others, of New York, to manufacture machinery, tools, etc.

Ferguson & Wheatley, Ltd., Collingwood, Ont., has been incorporated with a capital stock of \$40,000 by George H. Ferguson, Horace W. Wheatley, both of Collingwood, Ont.; Thomas W. Phipps, Toronto, and others to manufacture hardware, machinery, implements, etc.

The Union Garage Motors, Ltd., Toronto, has been incorporated with a capital stock of \$40,000 by David I. Grant, Mervil MacDonald, Edwin Smily and others to manufacture automobiles, parts, accessories, etc.

The Transcona Shell Co., Winnipeg, which has been operating the Grand Trunk Railway shops at Transcona, Man., proposes to establish a plant at Batavia, N. Y., for the manufacture of munitions.

A portion of the Metropolitan division of the Toronto & York Railway Co., Toronto, including part of the repair shop, was destroyed by fire Feb. 5, with a loss estimated at \$100,000. Considerable valuable machinery will have to be replaced.

W. J. Porter, 3 Brunswick Avenue, Toronto, is in the market for a screw cutting lathe, 11 to 13 in.

A syndicate in which E. F. Hutchings, president, of the Great West Saddlery Co., 112 Market East, Winnipeg, is interested, has secured a contract for 12 steel ships. The company proposes to erect a shipbuilding plant at Vancouver, B. C.

Indianapolis

INDIANAPOLIS, Feb. 11.

The Knull Motor Co., Pierceton, Ind., has been incorporated with \$30,000 capital stock to manufacture automobiles. The directors are Carl F. Knull, George A. Scifer and L. R. Deboer.

The Monterey Light & Power Co., Monterey, Ind., has been incorporated with \$60,000 capital stock, to distribute electric light and power. The directors are Charles M. Stern, William H. Vandenberg and V. H. Surghnor.

The Van Briggie Motor Device Co., Indianapolis, has increased its capital stock from \$150,000 to \$300,000.

A fire, Feb. 6, at the Indiana State Reformatory, Jeffersonville, Ind., caused \$500,000 loss. The structures destroyed were the trade school building No. 1, part of the foundry, storerooms and the refrigerating plant. David E. Payton is superintendent of the institution.

Milwaukee

MILWAUKEE, Feb. 11.

A resumption of inquiries for machine-tools is coming from all parts of the country from industries engaged in ordinary metal-working contracts, aside from strictly Government work. A gradual change is taking place from an almost exclusive war-business basis to one which calls for normal requirements in time of peace. The tractor manufacturing industry of Wisconsin is undergoing extensive expansion and is a good buyer of tools. Shops in other lines which have been engaged almost exclusively in Government work for the last year or more are busy with new orders,

which, however, do not require any considerable additions to equipment, but furnish a fair amount of buying for replacements.

The Kaukauna Machine Works, Kaukauna, Wis., and Mayer Brothers, Inc., Antigo, Wis., manufacturer of power hammers, have consolidated and are reorganizing as the Kaukauna Machine Works Co., with a capital stock of \$50,000. A. W. McLean, J. A. Watson and George Watson, founders of the machine works, have retired and stockholders in the new corporation are Lorenz and Louis Mayer, F. W. Grogan, F. M. Charlesworth, J. J. Jansen, M. H. Niesen, C. D. Boyd, Hugo Weifenbach and B. W. Fargo. Mayer Brothers established a plant for the production of power hammers in Antigo about three years ago, leasing the former group of the International Hoist Co. and Pioneer Iron Works. Recently, the plant was purchased by the Murray-Mylrea Machine Co., and Mayer Brothers were obliged to seek a new location. The Kaukauna plant includes a foundry, machine-shop and auxiliary buildings. No immediate enlargement is contemplated, but some additional machinery and tool equipment will be installed. The Mayer Brothers Little Giant power hammer will be made in three sizes, 25, 50 and 100 lbs., and larger types will be added shortly.

The W. Toepfer & Sons Co., 80 Menomonee Street, Milwaukee, has increased its capital stock from \$50,000 to \$100,000 to accommodate the expansion of its business and to provide for gradual enlargements. It manufactures iron work, stampings, steel floors for grain driers, etc. Irwin G. Toepfer is president and treasurer.

Fred A. Gardner, West Allis, Wis., proprietor of the F. A. Gardner Machine Works, Seventy-fifth and National Avenues, has disposed of the shop and business to Jacob Karth, who took possession Feb. 4. Mr. Gardner has taken an interest in and will become general manager of the Crown Metal Co., 871-881 Robinson Avenue, Bay View, Milwaukee, manufacturer of chemical lead pipe, plumbers' lead supplies and metals.

The Oneida Motor Truck Co., Green Bay, Wis., organized 10 months ago with \$300,000 capital and which recently moved into its new plant, erected at a cost of about \$100,000, has increased its capital stock to \$500,000. The officers are: President, F. E. Burrall; vice-president, J. C. Fogarty; secretary and general manager, J. P. Neugent; treasurer, Mitchell Joannes; sales manager, L. P. Fortin.

Thomas L. Thorsen, M. E., Menomonie, Wis., is receiving estimates for the proposed new co-operative central steam heating plant at Menomonie, consisting of a brick and concrete building, 114 x 174 ft., containing eight 1200-hp. boilers, with provision for four additional boilers; pump room, power room and coal bunkers equipped with automatic stokers, coal handling apparatus, ash conveyors, vacuum system, etc. The initial capacity will be 1800 hp., and provide a radiation of from 350,000 to 400,000 sq. ft.

The Blum Brothers Box Co., Marshfield, Wis., will spend about \$15,000 for equipment for the manufacture of veneers from the log.

The Auto Lamp & Radiator Co., 186 Fifth Street, Milwaukee, has incorporated its manufacturing and repair business with a capital stock of \$5,000. Howard R. Haberla is chief owner.

The Northern Casket Co., Fond du Lac, Wis., which recently established departments in its three factories at Denver, Col., Sioux City, Iowa, and Fond du Lac, for the manufacture of all-metal coffins, has increased its capital stock from \$200,000 to \$600,000. Tentative plans for additions to the metal casket department at Fond du Lac are being prepared. William Mauthe is president and general manager.

George S. Burrows, 19 East First Street, Fond du Lac, Wis., is increasing the size of his accessory and automobile top manufacturing business about one-third by acquiring the adjoining two-story building.

The Falls Motors Corporation, Sheboygan Falls, Wis., has a Government contract for military truck engines which will occupy its maximum capacity until June 1, 1919. The initial order is for 2000 motors, delivery of which will begin in March to the Kissel Motor Car Co., Hartford, Wis. Upon the completion of this order, further specifications will be given. Angelo R. Clas is secretary. The working force will be considerably enlarged after March 1.

The Globe Shipbuilding Co., Superior, Wis., has broken ground for a one-story shop addition, 50 x 125 ft., for the use of its pipe-fitting, blacksmithing and tinsmithing departments. Other additions are being planned. B. C. Cooke is president and general manager.

The Western Rope & Mfg. Co., Tulsa, Okla., which several months ago acquired the plant of the Schneck Machine Co., 809-817 St. Paul Avenue, Milwaukee, for the manufacture of engines and oil-well equipment, has purchased the plant and business of the Mueller Foundry Co., Cedarburg, Wis.,

which also includes adjacent acreage for extensions. The entire working force is retained and will be augmented at once. B. M. Gessel is general manager of the Western company.

The Milwaukee Steel Post Co., 415 Iron Block, Milwaukee, has changed its corporate style to the Newark Steel Post Co.

The Trenam Tractor Co., Milwaukee, which recently acquired the plant of the Central City Iron Works, founder and machinist, Stevens Point, Wis., has increased its board of directors from five to nine members. The Central plant is being overhauled and equipped for tractor manufacture and the company hopes to have its all-purpose tractor in production by April 1. J. J. Trenam is president and F. M. Schuler, secretary and manager. T. H. Hanna, Stevens Point, has been elected vice-president and counsel.

Charles Ferguson, Antigo, Wis., has disposed of the manufacturing and usage rights on his improved condenser and electrically operated burner for steam-powered motor vehicles to the Stanley Motor Carriage Co., Newton, Mass., on a royalty basis. The device will be used as stock equipment on all Stanley steam cars.

The Molle Typewriter Co., Oshkosh, Wis., is completing the work of making jigs, dies and tools and on March 1 expects to be ready to begin the manufacture of typewriters. The present force of 20 skilled workmen will be increased to 40, and the initial output will be twenty-five machines a day.

St. Louis

ST. LOUIS, Feb. 11.

The Dewey Airplane Co. of Dewey, Okla., has been incorporated with a capital stock of \$200,000 by J. E. Bartles, W. T. Cook and L. V. Ford and will equip a plant to manufacture aeroplanes for the Government.

The Farmers Ginning Co., Morrilton, Ark., P. I. Fliser president, will install about \$6000 worth of additional equipment in its plant.

The Sabine Canal Co., Vinton, La., S. L. Welsh manager, will extend its irrigation plant, install about \$40,000 worth of additional machinery.

Bristow, Okla., will expend about \$36,000 on equipment for its electric light plant.

The Washita Electric Power Co., R. K. Johnston, Pauls Valley, Okla., in charge, will install a 150-hp. boiler, 150-hp. Corliss engine, 2300 volt three-phase generator in its plant and otherwise extend it.

The Marland Refinery Co., Ponca City, Okla., will increase its capital from \$2,500,000 to \$10,000,000 and enlarge its plant.

The Shawnee Refining Co., Tulsa, Okla., with capital of \$500,000, John W. Hogan and others interested, will install equipment for a daily capacity of 2000 bbl.

The Pelican Lumber Co., Mound, La., will install a 250-hp. engine and other equipment for a daily capacity of 50,000 ft., to replace that recently burned.

The Missouri Pacific Railroad Co., E. A. Hadley, St. Louis, chief engineer, will equip a 10-stall round house and machine shop at Lake Charles to replace those recently destroyed by fire.

Ardmore, Okla., is preparing plans for the expenditure of \$225,000 for improving its waterworks plant. J. H. Curlock is city engineer.

The Walbert Stave Co., Batesville, Ark., will increase its equipment by the addition of about \$20,000 worth of machinery.

The Harry Benjamin Equipment Co., Central National Bank Building, St. Louis, is in the market for an alternating current 25 cycle, three-phase, 250 to 300 kva. transformer.

The Hope Bridge Co., Hope, Ark., has completed an addition to its plant and has commenced the manufacture of harrows. About 40 men have been added for work in this new department. A. F. Annen is secretary, general manager and chief engineer.

Texas

AUSTIN, Feb. 9.

The Beaumont Shipbuilding & Dry Dock Co., Beaumont, has been awarded two contracts by the Emergency Fleet Corporation, involving an expenditure of approximately \$10,000,000. One contract is for equipping 30 wooden ships and the other is for the construction of a floating dry dock at Beaumont. In connection with the shipbuilding plant, machine shops, warehouses, storage lofts and a 1500-ft. wharf will be constructed. Electric traveling cranes and other labor saving machinery will be installed. The contract for equipping the 30 wooden ships covers mostly labor, the Government to furnish the machinery. The dry dock will have an initial lifting capacity of 3000 tons and will be sectional in

design to permit of enlargement. The company employs about 600 men, and this number will be increased to 1200 within the next few months. J. W. Link is president.

James B. Girand, former city engineer, Phoenix, Ariz., and associates, have begun preliminary work on a hydro-electric plant in the Grand Canyon of the Colorado River at the foot of Diamond Canyon, in Mojave County.

Pat Clutter, Hale, will build a cotton gin at Bonham to cost about \$20,000.

J. B. Sanford, Eagle Pass, and associates will install two 75-hp. electrical driven centrifugal pumps, for irrigating 2000 acres near Eagle Pass.

L. D. Balkum and W. L. Balkum, Miles, will construct a dam across the Concho River near San Angelo and install an irrigation pumping plant.

The Gulf Coast Hardwood Milling Co. of Sweeney, has begun the construction of a hardwood lumber mill to be devoted exclusively to turning out material for building wooden ships for the Government. The equipment will consist of 150-hp. boiler, 100-hp. engine, 52-in. mill, rip saw, etc.

The Alamo Iron Works, San Antonio, has let contract for a four-story and basement, reinforced concrete warehouse containing about 28,000 sq. ft. of floor space. It is also extending its machine shop, 26x60 ft., and installing some new tools. E. A. Holmgreen is treasurer.

San Francisco

SAN FRANCISCO, Feb. 5.

The demand for machinery, especially the large automatic or partially automatic tools, remains good. Shipbuilding and airplane building are the two chief lines of enterprise in California to-day. Both are under Government control, and the shops working on these war aids are getting fairly prompt deliveries. Other shops find it impossible to get machinery, unless it is of a kind which may be in stock at some of the local jobbers. There are plenty of small lathes, for example, but the shop that needs a large one cannot hope for promise of delivery under a year or 18 months, unless the shop is doing Government work. The Union Iron Works and other large plants are sub-contracting considerable work to smaller shops, but these companies know the equipment of each shop and care is taken not to give it work that it cannot do without taxing the Government for more deliveries. These large companies are placing orders, especially for jigs and fixtures. As yet there has not been developed on the Pacific Coast any large shops for making jigs, fixtures and dies; but it is likely that the great demand will lead to the development of such shops. Outside of the Government work most of the orders for tools and machines are in the nature of "fill in" orders. Fair delivery is being obtained on them, except as stated above, when the demand is made for larger types.

The new shipyards are making good progress in equipment. The Pacific Coast Shipbuilding Co., San Francisco, is rushing work on its plant, and the assertion is made that it will be ready to lay its first keel in March. Nearly 500 men are at work clearing and leveling the ground, putting in piers and erecting buildings. The best progress has been made on the plate shed, which is nearly completed. The work on the machine shop, which will be 120 x 400 ft., is advancing rapidly.

The Union Iron Works, San Francisco, is planning additions to its Alameda plant, consisting of a number of slips and a four-story office building to cost \$70,000.

The Western Shipbuilding Co., Antioch, has secured contracts for wooden ships to the value of \$4,000,000, and will build its yards near Antioch. The incorporators of the company are C. A. Johnsen, Seattle; Fred Peters, Antioch; Edward Olsen and M. R. Monzy, Oakland.

The State and County Councils for Defense are making every effort to register 11,500 men, California's quota, for the nation's shipbuilding plans. California will need far more than this enrollment if its shipyards are to run at capacity, for more than that number will be employed in the Union Iron Works, the Moore Shipbuilding Co., and the Pacific Coast Shipbuilding Co., without regard to other shipbuilding companies in the Bay region and other parts of the State.

Some of the new shipbuilding companies are putting in machines to make their own bolts, nuts and rivets. The Los Angeles Shipbuilding & Dry Dock Co., Los Angeles, has put in machines of this kind, and the Long Beach Shipbuilding Co., Long Beach, recently formed from the consolidation of the Craig Shipbuilding Co. and the California Shipbuilding Co., is making its own requirements in bolts and rivets.

The Hanlon Dry Dock & Shipbuilding Co., Oakland, has received word from Daniel J. Hanlon, president, who is now

in Washington, that he has obtained a contract for six more 5500-ton freighters. This company recently turned its wooden shipbuilding plant into one to build steel ships.

The Liberty Iron Works, Sacramento, recently turned out its first complete airplane, known as a student plane, for the Government. It expects to turn out three per day and is enlarging its plant so as to be able to build regulation Liberty planes.

The American Can Co., Fruitvale, has just let the first contract in a new building program which will aggregate \$1,600,000. It is estimated that the new plant will have an output of 15,000,000 cans per year.

The Higgins-Zellerbach Paper Syndicate, San Francisco, is erecting a paper products plant at Stockton at a cost of \$1,000,000.

S. M. Gardner, Bay Point, and associates, have organized a company with \$100,000 capital to erect a factory to manufacture a new type of transformer.

The Skandia-Pacific Oil Engine Co., Oakland, announces that it will make considerable improvements and enlargements in its plant at East Oakland.

A strike of 190 unskilled laborers at the Judson Iron Works was adjusted Jan. 30, after three days. The men are members of the recently organized Shipyard Laborers' Union and demanded \$3.57 per day. They were getting \$3.25. Under agreement they will continue at the \$3.25 rate for 90 days, when they will be given \$3.50.

The Southern Pacific Co., San Francisco, is to spend approximately \$350,000 in modernizing its wood-preserving plant at West Oakland. J. Q. Barlow, assistant chief engineer, is in charge.

The Main Street Iron Works, San Francisco, has secured part of the plant and buildings of the Doble Co., at Seventh and South streets, and is installing an extensive equipment. When completed both plants will be operated under the one management.

The Pacific Electric Co., Los Angeles, is preparing plans for the erection of new repairs shops at Torrance. The work contemplated will include about 14 buildings to cost \$1,000,000.

The Cousins Tractor Co., Hanford, has secured permission from the State Commissioner of Corporations to sell \$70,000 worth of stock to equip a factory for the manufacture of tractors.

The Williams Brothers Aircraft Corporation, San Francisco, has been incorporated by E. F. Lloyd M., Chester L. and Percy J. Williams and H. A. Stiles, with a capitalization of \$100,000.

The Pacific Pump & Supply Co., San Francisco, has been incorporated with a capital of \$100,000 by George W. Glauque, Mountain View; Samuel G. Russell, Sacramento; John H. Reedy and William F. Ledwidge, both of San Francisco. The company intends to manufacture water-supply goods, including pumps, pipes and windmills.

The Bushnell Magneto Co., San Francisco, has been incorporated with a capital of \$150,000 by John B. Bushnell, W. S. Killingsworth, Jr., both of Vacaville, and James Butler, Stockton.

The Pacific Northwest

SEATTLE, Feb. 5.

Because of heavy snow in Portland most of the wooden shipbuilding plants in that city were idle for several days. Outside work at the plants of the steel shipbuilding companies was also suspended. Grays Harbor mills and lumber plants in other sections are seriously hampered in their operations by a shortage of logs, and unless the weather permits more continuous logging operations, with greater output, the wooden shipbuilding plants may face delays in receipt of materials.

The car shortage condition in the Pacific Northwest is being relieved by embargoes of railways reaching Chicago and the Atlantic Coast zone on shipments of commodities not essential to the prosecution of the war. Although there is relatively a light movement of empty and loaded cars west-bound, the supply of equipment demanded by Western shippers is getting easier. Railway men, however, are not confident that there will be a surplus of cars when embargoes are lifted.

More than \$25,000,000 worth of ships have been contracted for by the United States Emergency Board with Seattle yards in the last week, giving this city \$140,000,000 worth of ship construction. There are now 135 ships contracted for, totaling over 500,000 deadweight tonnage, and it is estimated that at least three-fifths of this amount will be constructed and delivered in 1918.

Demand for machine tools continues extremely active. There are a number of shipbuilding and other industrial plants under construction in the Northwest, and these plants are making strenuous efforts to secure supplies of all kinds. The demand for mining equipment and sawmill machinery has been good, but the supply of such equipment is more or less limited, due to excessive delays in shipments. Second-hand tools are very scarce and quickly picked up.

The Aetna Iron & Steel Co., Port Moody, B. C., plans to move its rolling mill plant from its present location in Port Moody to Rocky Point, where improvements will be made.

The organization of the Norway-Pacific Construction & Drydock Co., Everett, Wash., has been completed, and a site for a steel shipbuilding plant has been purchased in Everett. A plant costing \$1,000,000 will be built, and plans have been prepared for a large number of buildings, including ways for five steel ships, two wooden ships, wharves, and a 10,000-ton capacity floating sectional drydock. A pattern shop and foundry, a machine and engine shop, and annealing, forge and boiler works, a power house, and a steel fabricating shop, 30 x 240 ft. The company is figuring on four ships for the Government, the largest a 10,000-ton steel vessel. M. G. Thomle is president.

The Clarkston Manufacturing Co., Spokane, has been incorporated for \$100,000, and plans to establish a plant to engage in a general iron and sheet-metal business. C. G. Betts and John King are the incorporators.

The Western Drop Forge Co., Seattle, has awarded contracts for a one-story plant, 40 x 56 ft., to be first of several units. It will be especially equipped for marine drop forging. R. E. Lunkley is president.

The Oregon Planing Mill Owners' Association, Portland, Ore., announces that, following conferences with the Aircraft Production Board in Washington, they have been assured that Oregon factories, competent to manufacture airplane parts, will be given an opportunity to bid on contracts. Spruce will be supplied to them from the Government mill at Vancouver, Wash., in charge of Col. Bruce Disque.

The Puget Sound Bridge & Dredging Co., Seattle, operating the Washington Shipping Corporation plant, has received contracts from the Government for eight 4000-ton wooden cargo carriers, costing approximately \$7,000,000.

The Klamath Iron & Steel Works, Klamath Falls, Ore., has recently been organized with a capital of \$20,000 to take over the plant and holdings of the Grants Pass Iron & Steel Works at Grants Pass. The plant will be moved to Klamath Falls and enlarged. Special machinery will be installed for lumber mill repair work.

The Skinner & Eddy Shipbuilding Corporation, Seattle, recently received notice that it had been awarded contracts for fourteen 8800-ton steel freighters, costing approximately \$20,000,000. This gives the company a total of 19 Government contracts.

The Albina Engine & Machine Works, Portland, Ore., has leased an entire block, which will be used for extensions to its shipbuilding plant, necessitated by acceptance of four more contracts for the Shipping Board. The machine shop and foundry will be enlarged and equipment added.

The Grays Harbor Shipbuilding Co., Aberdeen, Wash., idle for six months, has been taken over by the Grays Harbor Motorship Corporation, and will be put in operation immediately. It will construct an engine-fitting plant, which will make it one of the large wooden shipbuilding plants in the Northwest.

The Wallace Shipyards, North Vancouver, B. C., according to report, have received contracts for four steel steamships from the Canadian Government, and contract for installation of machinery in steamer now under construction, at a total cost of \$5,000,000. The vessels will be of 5100 tons. Another set of ways will be added.

The plant of the Northwest Steel Co., Portland, Ore., was damaged in a recent fire with loss of \$10,000, largely to the plate and angle iron shops.

The Utah-Idaho Sugar Co. contemplates the erection of a plant near Walla Walla, Wash., to cost \$1,000,000.

The Coast Shipbuilding Co., Portland, is constructing a machine shop and a 500-ft. dock.

The United States Shipping Board has named Wilson W. Clark, secretary of the Clark & Wilson Lumber Co., Linton, Ore., and J. H. Bloedel of the Bloedel-Donoval Mills Co., Bellingham, Wash., to make a survey of the lumber resources of the Pacific Coast, to ascertain the amount of material that can be depended on during 1918 for shipbuilding purposes. It is stated that future ship contracts depend upon the outcome of this survey. The main difficulty now seems to be in the securing of logs. There is no problem of mill capacity, as this is sufficient to cut the lumber required by the Government in building ships and airplanes.